The Dock and Harbour Authority

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Editorial Comments

Presidential Addresses.

At this season of the year, when so many scientific and technical societies meet to inaugurate a new session, there is an abundance of Presidential Addresses and, from among them, we have before us copies of two addresses in full, and of one in abstract, all three more or less concerned with transport questions, delivered before professional institutions in the metropolis. Naturally, in perusing these *ex cathedra* pronouncements, we have looked to see if there is any allusion to matters which are the special concern of this Journal. It is rather disappointing to find, that although claiming to discuss various forms of post-war reconstruction in order to meet changes arising out of modern developments in transport and commerce, such essential features in the economic life of Great Britain as ports and harbours do not receive much notice, and this in spite of the fact that one of these addresses, viz.: that to the Institute of Transport by Sir William Wood, is entitled "The Threshold of a New Era in Transport," in which it will be generally felt by our readers that ports must play a very significant part.

There is certainly a passing allusion to the operations of harbour engineers in the address (perhaps not strictly an essay on transport) by Professor Lea to the Institution of Mechanical Engineers, but it is simply to the effect that in the study of mechanics of fluids, civil engineers have found it convenient to use models in the design of river and sea works.

The third address, an abstract of which will be found in this issue, by Mr. David Anderson, to the Institution of Civil Engineers, deals, in a comprehensive way, with the subject of post-war planning and reviews the advantages and disadvantages of planning programmes. A programme of planning is suggested, covering the rebuilding of towns damaged by war; home and Empire communications; the distribution of labour, and many other matters, among which the development of ports does not figure very prominently.

The foregoing survey is therefore rather disappointing, because if there ever was a time when the future prospects of British ports called for full and definite investigation, it is just now when the flying era has set in on flood tide, threatening to introduce very revolutionary features into port operation. Many port authorities indeed, have the subject under urgent consideration, though, as is natural perhaps, there is reluctance to disclose their plans and proposals until such time as the situation has sufficiently clarified itself to enable definite programmes to be decided upon.

In this connection it will be advantageous for our readers to refer to the Notes on Seaplane Harbours in this issue, which have been prepared by a writer with expert knowledge on the subject. Without going into precise detail, the article gives a summary of principles and ideas which must be kept in mind when considering the adaptability of harbour waters to the requirements of aerial, as well as sea surface, navigation. It will not be an easy matter to co-ordinate the two services and fit them, side by side, into the established order of ports, and, in fact, it is open to question whether it would not be preferable to keep them entirely apart. So far there has been definite evidence of a desire on the part of some port authorities to regard a combination of the services as part of their statutory obligations and to make provision accordingly. A decision on this essential point is of fundamental importance.

The Coromandel Coast.

The Coromandel Coast of India which comprises the length of the Eastern seaboard, extending from Cape Calimere on the mainland, just north of the northernmost tip of the island of Ceylon, to the mouths of the river Kistnah, is a source of unfailing interest to maritime engineers, and especially to those who make a study of the phenomena of coastal drift and sand travel. Included among these will, of course, be harbour engineers, one of whose most serious difficulties is to contend with the process of silting at harbour mouths. Indeed, the Coromandel Coast has all the attributes which make it unsuitable for harbour works of any importance. The shore, which is shallow and continually beaten by the surf of heavy seas, is without a single good natural indentation, and for a long time, communication with shipping could only be effected by flat bottomed boats.

The construction of the harbour of Madras was the first attempt to override, by artificial means, the disabilities of the coast line, and Sir Francis Spring, to whom the development of the harbour was very largely due, has affirmed that it was a gauntlet flung in the face of Nature; and even now, so far as our information goes, the problem of silting at the harbour mouth, though held more or less in check, has not yet been finally solved.

Editorial Comments—continued

The article in the present issue by Mr. J. M. Lacey, follows one which he contributed to this Journal in October 1940,on the harbours and ports of the Circar and Coromandel Coasts of South India. He traces the natural physical development of the coast line, with its geological features and describes the action of the monsoons which exercise such a powerful effect on the sandy tracts of which the coast is composed. Such artificial works as have been constructed on the Coromandel Coast convey a number of useful and important lessons as regards the formation of harbours under similar conditions.

Eirann Harbour Difficulties.

As will be seen from a report in this issue of a meeting held in Dublin recently, harbour authorities in Eire, in general, are finding financial difficulties in carrying on their operations.

In this respect, they are not altogether out of step with some of their English compeers, the great majority of whom have suffered more or less severely from war-time restrictions of trade. In the case of Eire, however, it is to be noted that the neutrality of the country, on which it counted for immunity from misfortune, has not saved it from the economical consequences of the war.

The remedies which were suggested at the meeting, for overcoming the crisis sounded more in the direction of wishful thinking rather than of practical measures. For instance, a large Eirann Mercantile Marine, however commendable as an idea, is not a thing that can be brought into existence at a moment's notice, or, indeed, in time to exercise any beneficial effect on the situation. An appeal to the Government for financial assistance was deprecated by Mr. Cosgrave, the former Prime Minister of Eire, who pointed out that it would entail Government control which might prove an awkward arrangement for the ports themselves. It would be difficult to suggest any means by which Irish ports can solve their present difficulties, and, in fact, their only hope appears to be an early termination of hostilities and an unfettered resumption of world trade.

Post-war Transport Scheme.

The Abstract given in this issue of a post-war transport scheme for the whole of Great Britain as outlined in a Paper by Mr. B. D. Richards to the Institution of Civil Engineers, indicates the rapidly expanding ideas of post-war planners. The scheme unifying all branches of transport by land, water and air, under centralised control, though prepared with undoubted care and ability, is so involved and comprehensive that it induces in the hearer, or reader, a feeling of inability to grasp the whole of its implications. Perhaps also it is a little alarming, because projects on so gigantic a scale rather tend to confuse the mind and bewilder the imagination.

The scheme undoubtedly merits careful consideration and it should not be lightly rejected, since, even if too ambitious and not wholly realisable, parts of it offer certain advantages over the present rather disconnected, not to say chaotic order of things.

At the same time, we feel it desirable to voice a word of caution and warning. Grandiose projects, however attractive and apparently desirable in themselves, may prove to be too gigantic for the limitations of human capability. It is a well known physical fact that immense structures, though designed on lines theoretically sound, may collapse from sheer intrinsic weight and size, just as in the biological world, prehistoric monsters have passed out of existence owing to their excessive bulk.

With superhuman intelligence nd powers, it might be possible to devise and co-ordinate a workable scheme for the centralised administration of the whole of the world's activities, but there will be frank agreement that such a dream is unrealisable. The problem is where to draw the line of safety in amalgamation and control, for, obviously, there is a point at which it passes the capacity of a single director, or even of a board of directors, however capable and however numerous his, or their, assistants and co-adjutants, to maintain effective supervision. Indeed, if the directorate is surrounded by numerous deputies with powers not unequal to its own, the merit of concentration disappears.

Our own experience in a limited sphere has been that too much centralisation results in procrastination and delay. The necessity of referring most, if not all important decisions to a supreme authority induces a relaxation of individual responsibility and brings about all the evils of what is known as " red tape."

This is, however, only one aspect of the matter. There is also the question of private enterprise as against State or Government control, into which we do not propose to enter at the moment. Indeed, it possesses a political aspect not altogether in keeping with the province of this Journal.

There are one or two curious omissions from the scheme as drawn up by Mr. Richards. River traffic is not mentioned, and though canals (possibly implying inland waterways) are included, ship canals are definitely excluded, while the ports are only partially included in so far as they are concerned with coastal shipping. The reason for the discrimination is not clear. We should have looked upon all port shipping movement as essentially bound up with inland traffic in the chain of transportation between producer and consumer. Certainly a large, if not a preponderant, part of coastal shipping is due to transhipment to and from ocean going vessels, and we do not see how a line of demarcation is to be drawn between those sections of ports which deal with one or the other class of shipping.

Doubtless these and other obscurities will be cleared up at the meeting on the 23rd November, when the Paper is read and discussed. As we shall then be at press, we must defer any further comment till our next issue.

The Expansion of Canal Traffic.

It has hardly needed the advocacy of so competent an authority as Mr. W. Fraser, the concluding portion of whose Paper on Canal Economics appears in this issue, to demonstrate that Canals have a definite standing in industry. Notwithstanding the long period of neglect which they have gone through in the past, they are unmistakeably coming again into the picture of British internal transport. It is stated in the daily press that during the period—a little over twelve months—in which they have been under Government control, and in spite of reduced imports and the disturbance of trade, caused by the North African campaign, traffic on the canals of this country has increased by 140,000 tons to an aggregate of 11¼ million tons. Calculated in ton-miles, the increase would be much greater, on account of the tendency towards longer hauls and a reduction in the mileage of empty barges. Moreover, during the present year, work on the canals has been handicapped by lack of rain, causing the water level to fall and reducing the amount of draught available for navigation. Also, there has been a pronounced shortage of crews and of boat-repairing staffs, together with a scarcity of marine engines.

In overcoming these drawbacks and achieving the advance recorded, canals are making a definite contribution to the economic rehabilitation of the country, and it is to be hoped that the new attitude in Government circles towards their use will enable them to go forward and re-establish themselves as a recognised agency of serviceable transport.

Medical Centres for Dock Workers.

The announcement elsewhere in this issue of the ceremonial opening, by the Minister of Labour and National Service, of a medical centre for port workers, provided by the Mersey Docks and Harbour Board at Huskisson Dock, Liverpool, marks a useful step forward in the promotion of the welfare of port workers. It follows a similar step already taken by the Clyde Navigation Trust. The object of these and other centres, to be established shortly, is to deal with the numerous minor accidents which inevitably occur during cargo handling and shipping operations at ports, and it is obvious that prompt treatment of these lesser casualties on the spot will have the effect of appreciably reducing the time lost by the men which well might ensue from trivial causes through neglect, delay, or unskilful methods of treatment. It is stated that over 500 cases have already been dealt with at the Huskisson Dock Medical Centre, thus indicating the number and frequency of these minor accidents among port workers. Hitherto, there has been no proper provision made for dealing with them on the spot, and, in many cases, the application of inadequate, or even unhygienic, methods have resulted in extended periods of sick leave, which might have been avoided. It is to be hoped that other ports will follow the examples of Liverpool and Glasgow.

Harbour Breakwaters

By MARCIANO MARTINEZ CATENA,
Engineer of Roads, Canals and Ports.

II.—Vertical Wall Breakwaters

General Consideration.

WHAT has been said in the first article† about mound breakwaters as regards accidental damage cannot be said about vertical wall breakwaters. In the former case, the damage caused by storms can be remedied; in the latter, such damage is irremediable. The catastrophe to the Valentia breakwater in December, 1926; those to the Antofagasta breakwater in July, 1928, and August, 1929; those to the Catania breakwater in February, 1930, and in March, 1933, and, finally, that to the Algiers breakwater in February, 1934, go to show that damage caused by tempestuous seas results in the definite destruction, partial or complete, of the breakwater.

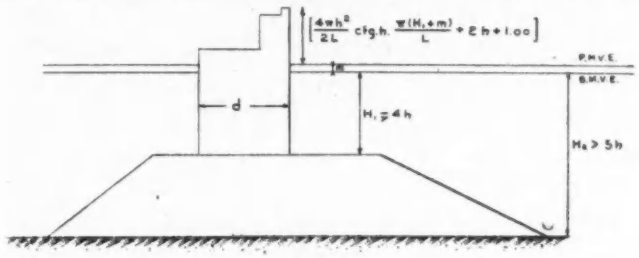


Fig. 1.

All these catastrophes have been succinctly described by Signor Lira in *Le Genie Civil* of April 8th, 1933, and in a communication by the same engineer to the Congress of Navigation at Brussels in 1935; that at Antofagasta, he described in *Le Genie Civil* of November 24th, 1928, those at Catania were described by Prof. Coen Cagli in his communication to the Brussels Congress of 1935, that at Algiers has been described by M. Renaud in his communication to the same Congress. This last communication is of special interest.

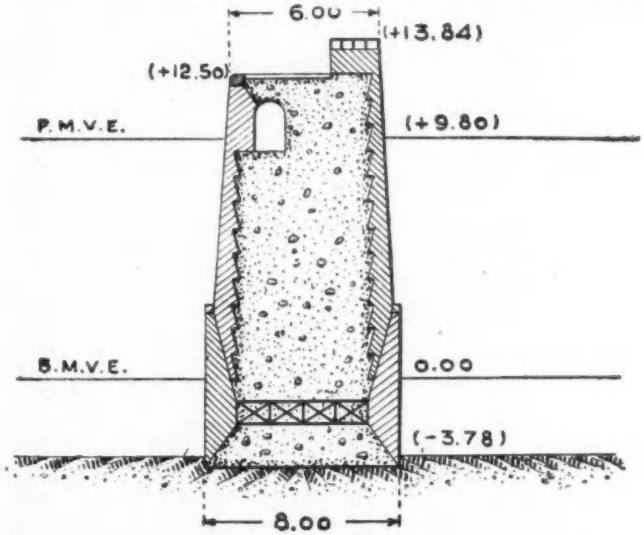


Fig. 2. Dieppe Breakwater.

The lessons to be gathered from these experiences are of great value and accordingly, the reader is referred to the publications cited above.

The design of a vertical wall breakwater is one of the most delicate problems which can be undertaken by a harbour engineer.

Having agreed that it is the function of vertical wall breakwaters to reflect the waves, which ought never to be allowed to break against the wall, let us proceed to consider the conditions, already enumerated, indispensable for the adoption of this type of breakwater.

Adducing the rupture of the wave in depths approximately equal to its height, if we adopt a factor of safety of 2 to $2\frac{1}{2}$, we arrive at the minimum depth which ought to obtain at the site and which must be greater than $4h$ or $5h$.

The reflection of the waves takes place when these impinge in a plane below at an angle of less than 45°, transforming themselves into waves of translation when the angle of incidence is greater than 45°; this latter is to be avoided, for which purpose, in order to adopt the vertical wall type of breakwater, it is an indispensable condition that the normal to its axis makes an angle less than 45°, with the direction of the storm.

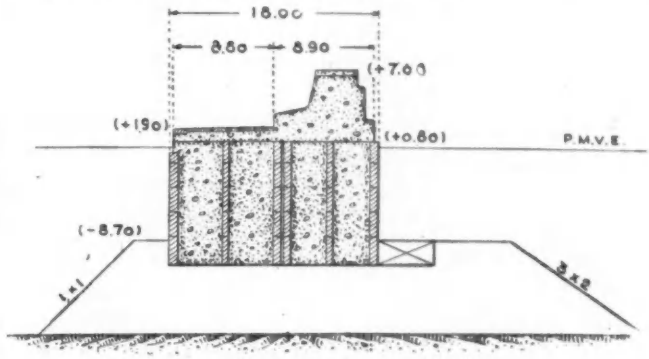


Fig. 3. Granili Breakwater (Naples).

Finally, the mass of the breakwater requiring a sound foundation in order to ensure its stability, it is essential for the adoption of this type of breakwater, that the nature of the bottom on which it is to be constructed, shall not be muddy, or of fine sand easily removable, and of depth which makes it impossible to dredge down to firm ground.

With the fulfilment of these three conditions, the alternatives of the vertical wall and sloping mound are comparable, so as to enable the more economical type to be adopted.

Fig. 1, represents a cross section of a vertical wall breakwater constituted by a built-up superstructure and a rubble substructure. This is the most general case, since when H_2 is not so great , the substructure can be eliminated, the wall being borne directly by the sea bottom. Examples of breakwaters without substructural foundations are those of Dover and Dieppe.

It has not been the superstructures of breakwaters, so constructed, which have been ruptured in accidents; a typical example is the Mustapha Breakwater at the port of Algiers, the superstructure of which demonstrated its sufficiency and showed that it was well designed, even for forces greater than those anticipated.

The same cannot be said of the substructures nor of the behaviour of the foundations on which the breakwaters have been built, to which may be attributed the accidents which have caused the downfall of some of them.

*Translated from the Spanish: "Diques de Abrigo en Puertos," in *Revista de Obras Publicas*, July, 1941.

†Published in the June, 1943, issue.

Harbour Breakwaters—continued

Taking this into account, we proceed to consider separately each of the three following constituents:

1. Superstructure.
2. Substructure.
3. Sea bed on the site of the breakwater.

1.—Superstructure

In regard to the superstructure, the following call for consideration;

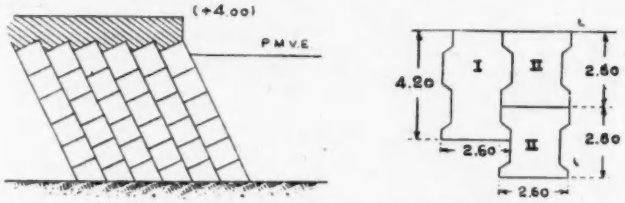


Fig. 4. Valparaiso Breakwater. Longitudinal view and detail of blocks.

(a) Procedure in Construction.

As an exceptional case, let us refer to construction by means of caissons under compressed air. Fig. 2, shows the Dieppe breakwater constructed in this manner. It is superfluous to say that it is expensive and subject to costly accidents.

Another constructional procedure is by the employment of cellular blocks or bottomless caissons which, deposited on top of one another, form vacant spaces, or wells, which are united with submerged concrete. Fig. 3, shows the Granili breakwater at the port of Naples. This system, employed in Italy at the ports of Naples and Genoa between 1910 and 1922, appears to possess a number of advantages, supposing that the reduction in weight of the blocks enables them to be of colossal dimensions without exceeding the load which may be considered safe and necessary for placing them in position by means of appliances, not unduly ponderous. This system offers a number of inconveniences: the submerged concrete results in material of inferior quality; the blocks are easily disturbed by tidal action while the wells remain incompletely filled; the fracture of caissons is frequent, leaving all the resistance to the fillings which, apart from the fact that they constitute independent vertical prisms, are not of excellent quality, with several other defects, so that this system has been abandoned by Italian engineers who were its warmest advocates.

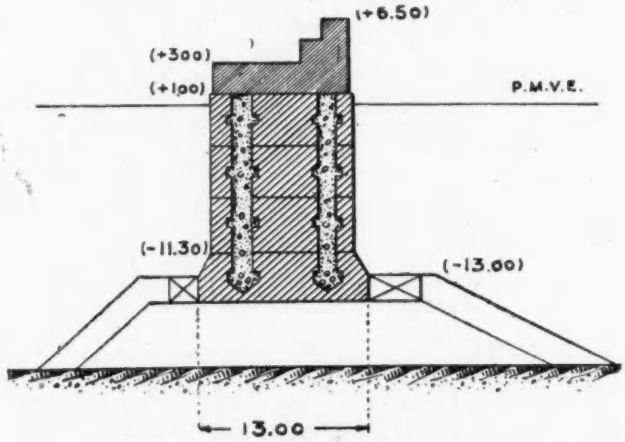


Fig. 5. Mustapha Breakwater (Algiers).

Another constructional system lies in the use of concrete blocks suitably placed, either with horizontal or inclined joints. Fig. 4, represents a longitudinal section and a detail of the breakwater constructed on this system at Valparaiso in Chile. It has the merit of not requiring appliances of heavy calibre for placing the blocks in position in the work, to which the natural bedding conveniently conforms. There are many disadvantages: arranged without mutual solidarity, the blocks offer little resistance to abrupt shock, which, as will be seen later, is the most powerful force against vertical wall breakwaters, and to local pressures to which two causes has been attributed the accident at Antofagasta, constructed in accordance with this method; another grave defect is the following: at the Mustapha breakwater at the port of Algiers, it was noted that under the action of storm waves, the immense monoliths which constitute its structure, underwent a rocking movement that produced rupture; undoubtedly, this movement will supervene more readily in lighter elements, without it being possible to adopt the remedy at Algiers, consisting of making the whole a single mass. The Chilean engineer, Señor Lira, who has seen in practice the behaviour of these blocks in works successfully constructed in the harbours of Valparaiso and Iquique and another, where there have been two accidents, namely the port of Antofagasta, commended the use of larger blocks.

It remains to explain the two constructive processes that most advocates adopt in practice for the two methods for building this class of breakwater, viz. (a) the use of large cyclopean blocks set in place by means of heavy lift appliances and (b) the use of giant caissons, conveyed to the site by flotation and sunk.

Fig. 5, represents the superstructure of the Mustapha Breakwater at the port of Algiers in accordance with constructive procedure (a) and Fig. 6 represents the superstructure of the breakwater designed for the port of Ceuta by the author in accordance with the constructive procedure (b).

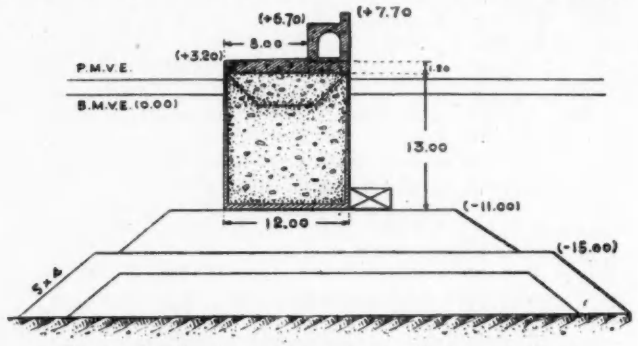


Fig. 6. Breakwater projected for the Harbour of Ceuta.

Method (a). Use of Cyclopean Blocks

The employment of large cyclopean blocks involves a length for these equal to the width of the breakwater and a transverse section sufficient to guard against fracture during the process of setting, necessitating blocks of a weight of 400 to 500 tons, for which the most powerful lifting appliances have to be used. A debatable point has been whether some of the blocks should be joined with others or no. Up to the years 1930 and 1931 it was considered that by reason of the enormous individual weight of the blocks they could sustain unaided the onset of the seas and from fear that the consolidated blocks might produce detrimental vibration in the construction, they were left independent to such a degree at the harbour of Algiers, where they were constructed leaving shafts as indicated in Fig.5, for the purpose of making them solid if desired; these were suppressed, the vacuities being filled with quarry refuse. During an investigation of the damage sustained by this breakwater in 1930 and 1931, it was found advisable to inject cement into the walls so formed and to adopt for the remainder reinforcement consisting of steel rods and rails surrounded with concrete. This arrangement proved to be satisfactory. With it disappeared the movements produced in the blocks during storms which caused the fracture of its crest, and the dreaded vibration has not been experienced. The superstructure behaved like a monolith capable of withstanding all the shocks of the sea, including in full the experience which occurred

Harbour Breakwaters—continued

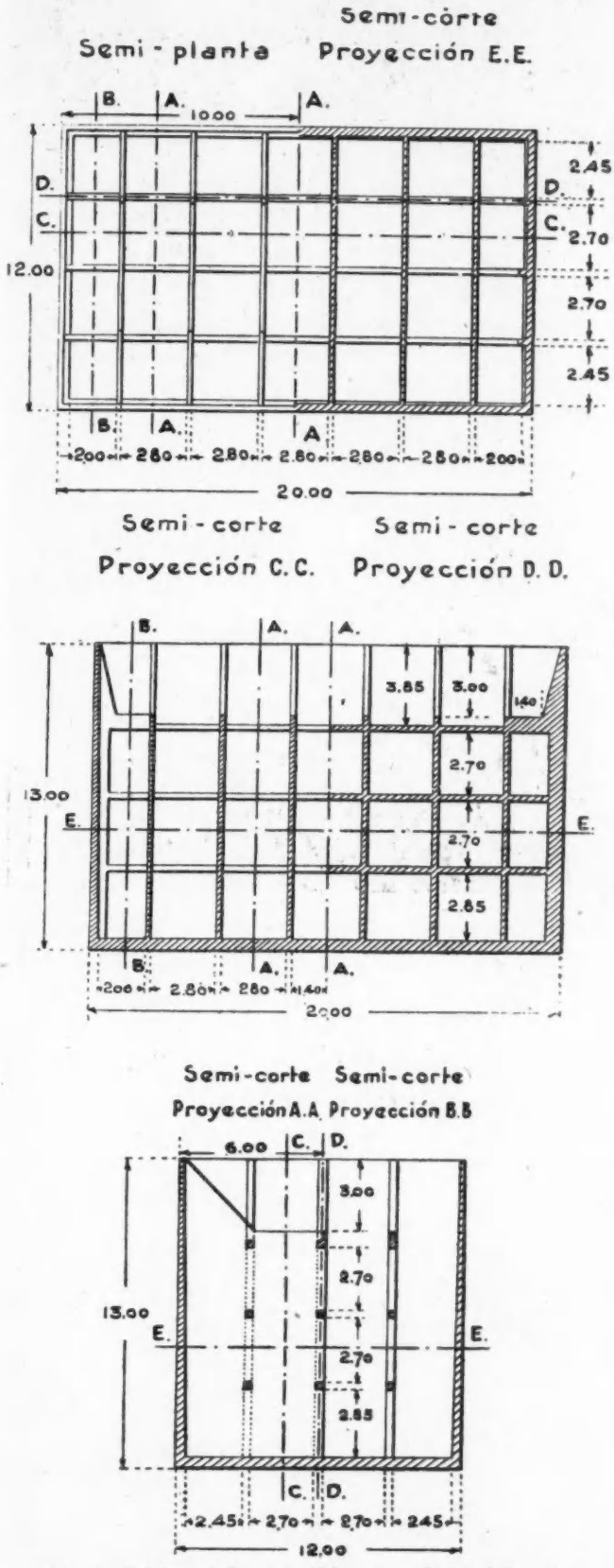


Fig. 7. Reinforced Concrete Caissons as designed for the Harbour of Ceuta.

on 3rd February, 1934, in the early hours of the morning, witnessed by all the persons connected with the work of the port and consequently thoroughly observed. Following an enormous wave, the crest of which passed over without breaking to overwhelm the breakwater and before the arrival of the following trough, watchers saw clearly the superstructure of the breakwater which had withstood the shock, and afterwards they perceived a like tremor in the same followed by a complete overturning towards the exterior, coincident with the movement of the trough and producing the effect of suction by the sea. If the substructure and the foundation had not yielded, the superstructure would have survived.

Method (b). Use of Caissons.

The latter method of construction by means of caissons of reinforced concrete, conveyed to the site by flotation and sunk, possesses advantages and drawbacks which we proceed to enumerate. It has the advantage of not requiring powerful lifting appliances, as does the method of cyclopean blocks; there are no horizontal joints; it admits of greater rapidity of construction and can give the breakwater all the width which it needs. As inconveniences, there is the necessity for a floating or a dry dock, or a slipway for launching the caissons; the lesser thickness of the walls of the caissons render these liable to damage, and since the interior concrete does not adhere well to the partitions which are arranged for purposes of resistance as independent cells, there are left masses of filling also independent, with consequent risk; the caissons are bedded imperfectly on account of their great length. Fig. 7 shows the caisson designed for the breakwater at the harbour of Ceuta. In it, the pockets which are a feature of caissons of reinforced concrete have been suppressed; for the purpose of withstanding the pressure exerted by the water on the sides of the caisson during flotation there have been arranged several transverse bulkheads which play a part analogous to the ribs of a ship, taking the pressure of the side walls, and as regards the outermost two, there have been arranged some vertical posts which distribute the stress over the reinforced concrete beams, with which the interior of the caisson is divided into longitudinal partitions equal to width.

With this, the caissons once filled and supposing the internal partitions destroyed, there would remain a breakwater constituted by massive monoliths of width equal to that of the breakwater and of height equal to that of the caissons, monoliths that without horizontal joints could withstand unaided the pressures produced by the waves and which, furthermore, are firmly interconnected by the horizontal beams which are embedded in them.

In the method of construction by caissons of reinforced concrete, some engineers have endeavoured to increase the economy by filling the internal compartments with gravel or sand. In our view, this arrangement ought not to be adopted, since if an economy is obtained, it is at the expense of loss of density in the mass, an important consideration in regard to the stability and resistance to slip and to overturning, and even more important as regards the strict relation with the period of oscillation of the breakwater as shown from observations and tests of this oscillation in experiments carried out at Algiers with a reduced scale model (vide *Travaux*, October 1935 and April 1940); furthermore, there are introduced sections of weakened resistance that are coincident with the stone filling.

Navigation Restrictions on the Humber.

Following an informal meeting held by Mr. Bewlay Watson, Regional Port Director, with the York Corporation, the navigational authority, in reference to a bye-law stipulating that ships over a certain size should not pass through Selby Road bridge except in daylight, and then only at slack water or against the stream, and when attended by a power tug, it was decided that a recommendation should be made to the Ministry of War Transport for the amendment of the bye-law, so as to permit the passage of ships through the bridge at night (subject to the replacement of the bridge leading-lights) and to abolish the requirement for the employment of a tug. Ship owners, through the Chamber of Shipping, have represented that the bye-law was both wrong in principle and unnecessary, as the navigational directions were such that a tug could be of no material assistance when passing through the bridge.

The Board Room.

The Board Room of the Belfast Harbour Commissioners

With Members in Session

The photograph on this page, kindly supplied by the Belfast Harbour Commission, was taken during the Board Meeting on 5th October last, the following being a list of the Members and Officers then present:—

Presiding is Sir Ernest Herdman, D.L., Chairman.

Following the horse-shoe lay-out of the table from left to right are the following Commissioners: Mr. Arthur S. Davidson; Sir Thomas W. McMullan, D.L.; Sir George E. Clark, Bart., D.L.; Mr. Hugh Armstrong; Mr. William Strachan; The Rt. Hon. Sir Thomas J. Dixon Bart, H.M.L.; The Rt. Hon. Sir Milne Barbour, Bart. D.L., M.P.; Mr. John McCaughey; Mr. Kenneth D. L. Sinclair, D.L : Mr. John F. Stevenson; Mr. Alex. M. Hamilton, J.P.; Mr. James F. McCue; Mr. Hugh Turtle; Mr. Kennedy Stewart; Mr. Samuel Berkeley, J.P., Sir Frederick Rebbeck, D.L.; Mr. John G. Michaels..

The following Commissioners were unable to be present at the Meeting:—Mr. R. P. C. Gotto, O.B.E.; Mr. John McNeill; Mr. Walter A. Edmenson; and The Rt. Hon. The Lord Mayor of Belfast (Alderman The Rt. Hon. Sir Crawford McCullagh, Bart., D.L.).

On the left of the Chairman are Mr. M. J. Watkins, C.B.E., General Manager and Secretary; Mr. James Alexander, Assistant to the General Manager and Secretary; Mr. F. W. P. Hampton, Chief Committee Clerk; on the Chairman's right is Captain A. Robinson, Harbour Master.

Seated at the table just below the Chairman are two representatives of the Press, Mr. P. Keenan, *Belfast Telegraph* (on the right), and Mr. A. Semple, *Belfast News-Letter*.

The following are particulars of the Board Room, viz.:—The Board Room is 54-ft. long by 21-ft. wide and is a handsome apartment, the side walls being decorated with panelled work and the ceiling enriched with coved and panelled work. Natural lighting is provided by four windows on the East side of the room, at the ends of which are two marble fireplaces. The seats of the Chairman and Principal Officers are on a dais facing the horseshoe table at which the Commissioners sit. The furniture of the Room is in polished oak. The Committee Room, also in oak, adjoins the Board Room.

The Harbour Office

The Harbour Office was built in the years 1852-1854—the then Harbour Engineer (Mr. George Smyth) being the architect. The Office was greatly extended and altered in the years 1891 to 1895. The architect was Mr. W. H. Lynn, R.H.A., and the Contractors, Messrs. H. & J. Martin, Ltd.

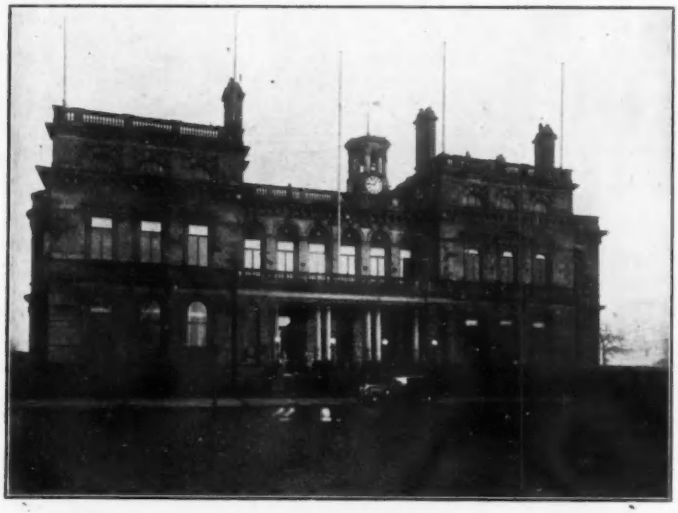
The enlarged building was opened in 1896 by the then Lord Lieutenant of Ireland, His Excellency George Henry, Earl Cadogan, K.G. The style of architecture is Italian of a very

Board Room of the Belfast Harbour Commissioners

(continued)

chaste type. The building is faced with chiselled-cut stonework from the Giffnoch quarries.

At the head of the grand staircase, a conspicuous feature of the building, is an extensive lobby leading to a handsome hall in which special meetings are held and in which Royalty has been entertained from time to time. The hall is 72-ft. in length by 34-ft. in width with a large semi-circular recess window about 18-ft. by 10-ft. Around three sides of it is a number of stained glass attic windows of semi-circular form, which are emblazoned with the emblems of various countries, including the Colonies.



The Harbour Office.

The staircase is well lighted by a roof lantern, the ceiling around which is coved and panelled.

Facing the entrance on the ground floor is a stained glass window in three panels, the centre one of which is allegorical of commerce and the side panels of navigation, engineering, spinning and weaving, and on the upper floor there are several other windows also of stained glass, on which are displayed in heraldic colours the Coats of Arms of several of the principal ports in the United Kingdom.

The tower clock, erected in 1895, is a feature of the building and the vicinity. It is interesting to note that at one time the hours of sailing of passenger steamers were determined by the tower clock.

New Lighthouse on U.S.A. Atlantic Coast

The Cleveland Ledge Lighthouse, the first major light station to be constructed on the Atlantic coast in recent years, was commissioned on June 1st last, and is now in operation.

The station marks the southern approach to the Cape Cod Canal, which is a short cut between northern and southern New England ports and a means of avoiding the dangers of passage around Cape Cod. It also marks the outer end of the Cleveland Ledge Channel. The importance of a lighthouse at this point is increased by the fact that the nearest land is more than two miles away and frequently obscured by fog.

Cleveland Ledge Lighthouse is built in about 21-ft. of water, on a ledge, about 1.8 miles from shore. The foundation consists of a circular reinforced concrete caisson about 52-ft. in diameter and 52-ft. high, with walls 5-ft. thick. This caisson rests on a wood crib built of two tiers of 12-ft. by 12-ft. timbers. The interior of the caisson is filled with rock. The top of the crib is surfaced to form the main deck of the structure, and above this rises a two-storey reinforced concrete building surmounted by a tower about 50-ft. high of the same material. An antenna tower and platform of structural steel also rises from the main deck.

The Design of Jetties

The following two letters appeared in the November issue of *The Structural Engineer*, following the publication of the article by Mr. R. R. Minikin on "The Design of Jetties," reproduced by permission in the last two issues of this Journal.

To the Editor of *The Structural Engineer*.

Sir,—In his paper "The Design of Jetties," Mr. Minikin has given us yet another piling formula. He does so because he is of the opinion (and rightly so) that a piling formula should contain a factor which makes allowance for the embedded length of the pile. This, it is stated in the paper, the Hiley formula does not do. That statement is clearly based on the assumption that the "c" in the Hiley formula is the temporary compression *from tables*.

If that were so it would be a legitimate criticism of the Hiley formula, but it is not so. The "c" in the Hiley formula is the total temporary compression, the real value of which depends, amongst other things upon the embedded length. If the user of the formula chooses to obtain a value from tables which are not applicable to the case, that is not the fault of the formula.

The writer has always held that the temporary compression should be actually measured in every case, and if that is done there is no need to calculate it by the roundabout method of a separate formula as suggested by Mr. Minikin. Further, it will be noted that "m" and "n" in Mr. Minikin's expression for "q," as well as "ϕ" in his main formula, have to be estimated, and it is certain that in these estimates there will be a greater risk of error than if the value of "c" were estimated directly, or even obtained from tables. However, there is no need to do either, as "c" can be obtained more readily and more rationally by the obvious method of measuring it.

Yours faithfully,

GOWER B. R. PIMM.

16th August, 1943.

To the Editor of *The Structural Engineer*.

Sir,—I would like to express my appreciation of Mr. R. R. Minikin's article on the Design of Jetties.

There are two points I would like to remark upon. Firstly, a large number of jetties are constructed heading out into a river, in which case the main tidal stream is perpendicular to the axis of the structure (i.e. not as shown in Fig.2 on page 125). With the maximum stream flowing, the normal method of approach would be to nose gently ahead parallel to the jetty, on the upstream side, and allow the current to bring the ship alongside. The ahead velocity may be only sufficient to give steerage way but the transverse velocity, due to the current, may be considerably greater. The resultant velocity can therefore make an angle of 60° or 70°, with the jetty axis, although this, of course, does not mean that the axis of the ship has the same inclination.

This condition can make the lateral blow greater than that for the conditions assumed in the article.

Secondly, and incidentally compensatory for the above, the distribution of the blow through the jetty may well exceed the length given for a 450 spread angle, i.e. 2B where B is the width of the jetty.

The deck system is usually very rigid and distributes the lateral blow by beam action.

From observation of narrow timber structures, it is apparent that bents over a length of 4 or 5 times the width may be affected, although not all, of course, taking the same amount of load.

It must be borne in mind that the piles in the end bents normally have a greater unsupported length than the remainder and the deflection being greater helps to relieve impact stresses considerably.

The most important point to remember in the design as regards impact is to provide a fender system which has yielding properties independent of the main structure. Unfortunately it is all too common to see fenders bolted direct to concrete piles.

Yours faithfully,

JOHN BERRY (Associate-Member).

30th August, 1943.

Movable Bridges across Port Waterways

*Discussion on the Development of the Chicago Type Bascule Bridge**

Mr. Clinton H. Hanover, Jr., Assoc.M.Am.Soc.C.E., Chief of Bureau of Bridge Design, Dept. of Public Works, New York, U.S.A., made the following contribution to the Discussion:

The original sources of some developments in the art of movable bridge design might be hard to trace, since not only engineers employed by agencies owning the bridges, but also engineers employed by contractors, manufacturers, and consulting engineers, have from time to time added their share to the general development. Many of these improvements in design, especially improvements in the design of details, are reflected in the latest specifications prepared under the auspices of various engineering societies. These specifications are based on the experiences of many practicing engineers and apply to all types of movable bridges.

However, the choice of the general type of movable bridge is still a question for determination on the basis of conditions at the site and on the basis of the requirements of navigation and highway or railway traffic. For this reason, a full discussion of the advantages of any one type of movable bridge is of interest to engineers responsible for the selection of types for use at various locations.

Mr. Becker states that, with the development of the City of Chicago, the rivers were deepened and widened, providing channels varying in width from 100-ft. to 250-ft. Table 1 gives among other things, the clear span and the width of the river channel for each of the Chicago-type bascule bridges on these rivers. It is interesting to note that, for many of the bridges, the clear span exceeds the width of river channel considerably. As an example, a few of these are as follows:

Location	Width of river channel, in feet	Clear span in feet	Ratio, clear span to channel
West Division Street (Canal)	90	135	1.50
West Division Street (River)	100	155.67	1.56
North Western Avenue ...	121	184.58	1.52
North Halstead Street (Canal)	90	184.58	2.05
West Webster Avenue ...	120	161.25	1.34
West Belmont Avenue ...	75	161.25	2.15

It is the writer's understanding that in each of these cases the clear span exceeds the river channel because the bridge does not cross the channel at right angles but crosses at a considerable skew, and that in each case a normal bascule, or bascule without skew, was used.

As the leaves of a normal bascule bridge rotate on an axis which is normal to the centre line of bridge and centre line of roadway, it has been necessary at skew crossings to provide spans with a clear distance between piers considerably in excess of the clear width of channel. Also this condition has required that the large rectangular bascule piers be placed at an angle to the direction of the channel flow, thus disturbing the flow of the current as well as blocking off a greater width of the waterway to the flow of the current. At such locations, in order to protect river traffic, it also has been necessary at times to provide independent fender systems of considerable cost extending along the lines of the real channel.

In 1940 the Department of Public Works of New York, N.Y., began studies for a new bascule bridge at Hamilton Avenue over the Gowanus Canal in Brooklyn. The intersection of Hamilton Avenue and the canal makes an angle of 56°. The old bridge at this location was a skew bascule bridge of the rolling lift or Scherzer type. The main girders of this bridge were framed normal to the channel lines, the axis of rotation being parellel to the channel. This resulted in the main girders being placed rather close together, thus limiting the available space for counterweights and machinery, and in large triangular parts of the roadway framing being cantilevered outside of the main girders. Although the clear channel width was only 46.5-ft., in order to obtain any semblance of substantial framing, a double-leaf bascule bridge was used. The bridge was built in 1905 and had proved to be structurally somewhat flexible, resulting in high maintenance costs.

In making studies for the new bridge several schemes were tried, among them a skew bridge, similar in arrangement to the original one, and a double-leaf bridge without skew. The skew design was not favoured because of the experiences with the former bridge. A double-leaf bascule without skew would require a clear span parallel to the bridge approximately twice as great as the width of the skew channel. The estimate of cost of the bridge without skew was so great that it, too, was not considered with favour.

On further study, the writer developed a new type of skew bascule bridge that has the advantages of a bascule without skew, without the disadvantages attended by the extra length of span. The forward leaf of the bridge is made to fit the skewed channel crossing precisely, and the rear leaf is built normal to the channel lines, thus making the forward leaf as short as possible and allowing the centre line of trunnions to be parallel to and as near to the channel line as possible. This gives the shortest span from centre line of trunnions to toe end of span that can be arranged. The main girders are spaced as far apart as may be desired, thus permitting complete and substantial bracing systems to be used, allowing ordinary concrete in the counterweights for counterbalancing, and providing maximum room for locating the operating machinery between the main girders. Since the piers are built in line with the channel, the channel flow is obstructed the minimum amount.

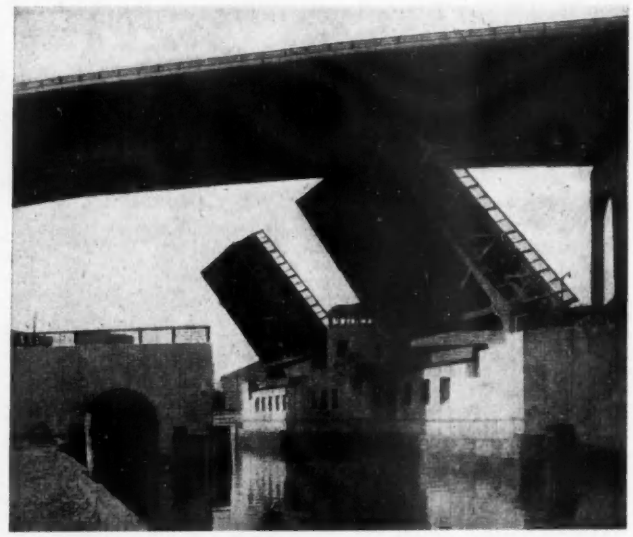


Fig. 20. View of the Underside of the Bascule Leaf in open position.

Although the centre of gravity of the forward leaf is not midway between the trunnions or supports, the centre of gravity of the counterweight can be midway between the trunnions, thus providing a counterweight of uniform section throughout its length. Fig. 20 is a view of the underside of the bascule leaf in the open position, showing the framing of the main girders as well as that of the other structural members of the forward leaf. The adoption of this type of bridge allowed the use of a single-leaf bridge and resulted in a great saving in cost. The same scheme can be used in a double-leaf layout for wider skewed channels.

This experience in the City of New York may be of interest in other cases where skew crossings are involved. It is the writer's belief that natural conditions of the relative alignment of roadway and channel result in considerably more skew crossings than square ones, especially since the tendency is to maintain a straight alignment on highways to accommodate modern high speed traffic.

Mr. Becker states that in the design of the South Canal Street bridge some new ideas are incorporated, among them the use of

*The Paper by Mr. D. N. Becker on this subject appeared in the September, October and November issues of *The Dock and Harbour Authority*. Reproduced from the Journal of the American Society of Civil Engineers. February, 1943.

Movable Bridges across Port Waterways—continued

open grating for the roadway pavement. This type of grating early was recognized as economical if used as a floor for movable bridges. The City of New York has nine bascule bridges with this type of decking installed, some of them older bridges on which the floor has been reconstructed. The Hamilton Avenue bridge shown in Fig. 20 is one of the new bridges on which this type of floor was installed. The writer agrees that its use saves weight not only in the floor but in the supporting members and in the counterweight. In addition, it reduces the operating forces required, as both friction and wind load are lessened, thus reducing the power and the weight of machinery required.

It is interesting to note that, on the South Canal Street bridge design, the use of an hydraulic drive is contemplated. In 1937 the writer made a study of this type of installation as it was recognized that speed control with the hydraulic drive could be very much more sensitive than with an alternating current electrical drive. However, at that time, the idea was rejected because the manufacturers of the various hydraulic drives available were not in a position to assist in the development of the automatic control necessary to duplicate the protection provided by limit switches in the standard electrical set-up. Duplication of this protection required the redesign of the hydraulic units so that these automatic controls could be attached to them. Another factor against adoption of the hydraulic drive was that some systems worked on a high-pressure basis and others on a low-pressure basis, and, in case of emergency replacements being required, there necessarily would have to be full dependence upon only one or two manufacturers.

Mr. Armour T. Granger, M.Am.Soc.C.E., Professor and Head of Civil Engineering, University of Tennessee, U.S.A., said, all engineers engaged in the design of movable bridges should be interested in this timely and valuable paper. The compresenhive account of the development of the Chicago bascules from the crude structures of the past century to the excellent and artistic spans of the present reveals strikingly the tremendous advances which have to been made in the design of bascule bridges during this period.

Pound for pound and dollar for dollar, the bascule probably presents more intricate problems than any other type of bridge structure. The successful solutions of many such problems are presented in the paper. Certainly the engineers who have participated in the design and development of the Chicago bascules have contributed greatly to the science of designing movable spans.

The writer is strongly of the opinion that the simple trunnion bascule, with the counterweight beneath the floor, as exemplified by the Chicago bridges, is in general the most desirable of all bascule types, including those types of double-leaf bascules which require the span to function as a simply span or as anything other than a pair of shear-locked cantilevers when the leaves are closed.

Among the many interesting and difficult problems requiring solution in the design of a bascule are the following: Method of supporting the inside trunnion bearings, details of floor breaks, rail joints, provisions for trolley wires during movement of span, span locks, arrangement of counterweights, arrangement of operating machinery (frequently in limited space), adequate provision for proper machinery alignment, prevention of moving interferences, and many others. Some of these have been discussed in the paper. Limitations of space doubtless have precluded the consideration of others of interest and importance. It is hoped that in his closure the author may comment on more of these details.

It would be of interest, for example, to have some information relative to the development of the centre locks for double-leaf spans. Various types of locks have been devised and used and some of them have not proved satisfactory. (This statement is general and is not made in reference to the Chicago bascules). A thoroughly satisfactory lock should grip both leaves firmly, without play or clearance, should be arranged to engage and disengage readily, and should be so designed that no part of the lock can foul either leaf. The lock mechanism, of course, should be so interlocked with the operating machinery that power to operate the span cannot be available until the locks are opened fully. Any lock which involves vertical play or clearances with the lock in closed position is likely to cause objectionable bumping or impact when loads pass over the floor break.

The details of the centre floor break are also important. Such breaks should be designed to insure smooth riding over the joint under all conditions. The overlapping tooth joint, with teeth tapered in plan and rounded at the ends on a vertical radius, can be arranged so as to be entirely satisfactory for the centre roadway break of a double-leaf bascule.

Some discussion of the choice of the type of trussing used would be of interest. Warren trusses were employed for the West Lake Street bridge (Fig. 12), but apparently Pratt trusses were used for all the other bridges. It has been the opinion of the writer for many years that, except for shallow spans with deep members where secondary stresses may be of consequence, Warren trusses are preferable to Pratt trusses for practically all riveted bridge spans and the great popularity of the Warren truss in recent years evidences the fact that many engineers are of this opinion. A statement of the reasons why Pratt trusses were selected for the Chicago bascules should therefore be of value to the profession.

Another detail of much interest is the use of the live-load bearing or forward support in the front wall of the bascule pier. It would appear that the desirability of using such supports is somewhat open to question. In designing double-leaf, deck-girder, bascule spans the writer has investigated their use on more than one occasion, but has omitted them. These supports will afford an appreciable saving in the weight of the forearm girders or trusses, but they have attendant disadvantages which tend to offset this. These disdvantages may be stated as follows:

(1) With the forward supports omitted, the double-leaf, trunnion bascule is statically indeterminate for live load to the first degree only, and the actual stresses can be determined quite closely. The introduction of a forward support in each leaf renders the span threefold indeterminate, and the computed stresses therefore are likely to be considerably more in error than if the forward supports are omitted. The fact that the inside trunnion support usually has a certain amount of flexibility contributes to the uncertainty as to exact stress distribution. Furthermore, since the relative simplicity of the trunnion bascule (as compared to other types) is one of its principal advantages, it seems rather a step in the wrong direction to detract from this simplicity.

(2) It is seldom, if ever, possible to make the forward support carry live-load reaction only. With full live-load covering both forearms between the forward supports, a part of the dead load on the trunnions will be transferred to the forward supports, and it is possible in some cases, where the live-load is heavy, for the "live-load support" actually to be subjected to the full dead load on one trunnion in addition to the full live-load reaction.

The truth of this statement should be apparent from the following considerations:

With no live load on the span, the live-load bearing (forward support) and live-load anchor at the rear are adjusted presumably so that the parts of these details on the fixed and moving portions are just in contact. Now assume full symmetrical live load on both forearms—which condition will give zero shear at the centre locks and negative moment for the full length of both leaves. As each leaf is held vertically at the forward bearing and rear anchor, that part of the span between these two points then will deflect upward. This upward deflection will reduce the dead load on the trunnion bearings; and, unless the trunnion supports are quite flexible, enough dead load will be thrown off the bearings to the leaf to balance the moment of the live load on the leaf about the forward support, with a consequent increase in the reaction on the forward support. As the distance from the trunnion to the forward support is small compared to the length of the forearm, this increase in the reaction is large, and, with some span dimensions and live loads, it is possible to take the dead load completely off the trunnion bearings and transfer it to the forward support.

Such behaviour of the span calls for heavy forward supports. Although the total resultant load on the foundation, of course, is in the same location with or without the forward support, the manner in which it reaches the foundation is quite different in the two cases. It is sometimes difficult to care locally for the heavy concentrations resulting from the forward support and to ensure that they are distributed properly over the foundation..

Movable Bridges across Port Waterways—continued

Transference of at least part of the dead load back and forth from the trunnion to the forward support seems rather objectionable and appears to detract from the simplicity inherent in the trunnion bascule.

The writer should state again that his investigations of this matter have been made only on girder spans, but a similar line of reasoning should apply to truss spans.

Probably more ingenuity has been exercised in devising methods of supporting the inside trunnion bearing than in connection with any other bascule detail. Some very ingenious ways of accomplishing this on the Chicago bascules are described by the author. Another method, similar to the longitudinal, **S**-shaped girders used for many of the latter bridges, consists of supporting the inside trunnion bearing on a very short girder hung from a horizontal longitudinal girder overhead which is supported by the front and rear walls of the pier. This arrangement can be used where the distance from crown of roadway to centre line of trunnion permits..

Another good arrangement (patented) consists of supporting the inside bearing on a bracket cantilevered longitudinally from an inside trunnion column which rests on the floor of the pier. The column is so shaped in elevation as to fit into a notch in the counterweight to clear the span in the fully raised position.

It is desirable, but sometimes rather difficult, to provide approximately equal rigidity in the supports for inner and outer trunnion bearings. If there is much difference in the dead-load deflection of these supports, trouble may be encountered during and after erection.

The writer has had occasion to investigate the matter of transverse centering devices for the leaves of girder bascules and always reached the following conclusions:

(a) Transverse centering was not needed; and

(b) Any device that would deflect the leaf laterally by any appreciable amount would need to be so large and powerful as to be impracticable.

There are a number of spans with wide roadways, having interlocking tooth centre breaks and no transverse centering devices, and so far as the writer is aware there has never been any transverse fouling on these spans.

The author has made a few comments relative to the comparative appearance of bascule and vertical lift spans, and a word on this subject may be in order. Having been connected with the design of many spans of both types, the writer is decidedly of the opinion that the bascule span is not necessarily superior in appearance to the vertical-lift span. Certainly many deck or railing-height bascules are more attractive than many vertical lifts, but in the eyes of many engineers nothing is more hideous than some types of through bascules with overhead counterweights. With thought and care the lift span can be given a very fine appearance. In the opinion of the writer, the Harlem River (Triborough) lift span in New York, N. Y., is not excelled in appearance by any movable bridge in the world. Certainly, however, the required horizontal and vertical clearances at Chicago, in general, are not particularly favourable for lift spans.

In conclusion, the writer would like to state clearly that no statement made in this discussion is intended to imply unfavourable criticism of any point in the design of the Chicago bridges. They are certainly a worthy monument to the city and the engineering profession, and the paper is a valuable addition to the literature of movable bridges.

Publications

Papers on the following subjects have been presented for reading before the Institution of Mechanical Engineers during the coming session. Static and Clinging Friction of Pivot Bearings, by Mr. M. C. Hunter; Loads Borne on Elastic Supports, by Professor E. H. Lamb, and Protective Air Vessels for Rising Pipe Lines, by Mr. A. M. Binnie.

A new edition of the **Handbook of the Institute of Transport,** has been issued and may be obtained on application to the offices of the Institute. It contains an account of the Foundation of the Institute, with particulars of the Objects as set out in the Royal Charter, of Membership, of Rules for Local Sections and Transport Discussion Groups, and of Examination Regulations, with Syllabuses of the Associate Membership Examination.

The 26th annual number of **Shipping Register and Shipbuilder,** published at 610, St. James St., Montreal, is an imposing publication of 144 pages, profusely illustrated, containing a number of articles dealing not only with shipbuilding in Canada, but also, in a series of descriptive sketches with Canadian harbours and waterways. It exhibits numerous photographs of personalities connected with the Canadian Mercantile Marine.

A National Transport Problem—the approach to a long-term plan. Pp. 27. Price: one shilling. London, 1943: The Railway Gazette.

Although any comprehensive review of the country's transport problems necessarily includes ports and inland waterways, we have some reluctance in commenting on the present publication, as its main theme falls outside the immediate purview of this Journal. There are a few casual allusions to docks and canals, but the chief and preponderating argument lies along the lines of traffic by road and rail, and the question of state management apart from, or possibly in association with, private ownership. Doubtless, subject to some modification, the questions at issue are also applicable to ports and inland waterways, but the statistics and figures adduced in the pamphlet, except in one instance, relate entirely to rail and road traffic.

The pamphlet is a reprint of a series of six articles which recently appeared in *The Railway Gazette*, and the headings are perhaps a sufficiently appropriate guide to their subject matter, viz: (1) The Future of Transport; (2) The Problem of the Peaks; (3) Transport and Its Track; (4) Transport and Full Employment; (5) Transport and Catering Policy; and (6) A Plan to secure Economy and Efficiency. There is a foreword by Sir James Milne, Chairman of the Railway General Managers' Conference.

It is an argumentative survey, and, as Sir James Milne says: "It is unlikely that there will be unanimity of opinion upon the proposals, but they will serve the purpose of stimulating discussion upon what will be one of the most prominent of the post-war problems, and on that ground alone, the suggestions are worthy of the most careful consideration."

Medical Service for Merseyside Dockers.

An experimental step has been taken on Mersey-side in the way of providing free medical attention for dockers. A Centre has been opened at the Huskisson Dock, Liverpool at a cost of £600. It is under the control of a Medical Service Committee which consists of the following: Chairman, Mr. R. J. Hodges, General Manager and Secretary, Mersey Docks and Harbour Board; Members: Mr. H. O. Pugh, Ministry of War Transport; Mr. P. A. Heath and Dr. K. Biden Steele, Ministry of Labour and National Service; Mr. W. R. Roberts, Employers Association of the Port of Liverpool and the Liverpool Steam Ship Owners' Association; Mr. V. S. Mangham, Mersey Ship Repairers' Federation; Mr. S. Mahon, Transport & General Workers' Union; Mr. W. J. Tudor, Confederation of Ship Building and Engineering Unions; Mr. H. Winstanley, Chief Constable, Liverpool; Dr. W. M. Frazer, Medical Officer of Health for Liverpool; and Dr. F. T. H. Wood, Medical Officer of Health for Bootle.

The scheme is designed in the interests of dock labour at the port and when in full operation, much time will be saved in being able to deal with minor injuries on the spot. A twenty-four hour service is aimed at, and if the present centre proves a success, it is proposed to open three more centres in Liverpool and one in Birkenhead.

The Dock and Harbour Authorities' Association

Its Constitution and Scope

By W. ASHLEY CUMMINS, B.A., LL.B., J.P.

Following the notice in the October issue that the Railway Companies had joined the Association in respect of their Docks and Harbours, it will be of interest to recall the article in *The Dock and Harbour Authority* for May, 1937, which gave a short description of the origin and work of the Association.

Formation.

For many years prior to 1919, in which year the Association was formed, a Committee representing 10 or more of the principal public Dock Authorities met periodically for the purpose of considering matters of general interest, such as Public Bills and Regulations affecting statutory authorities, and took such action thereon as was necessary for safeguarding the general body.

During the last war the attitude at first taken up by the Government in repudiating claims by a number of Authorities for Dock and Harbour dues, made it desirable that this unofficial body should be replaced by a Central Association clothed with a general authority to act in the common interest.

Although, as has been said, it was the action of the Government during the last war which brought the question of the formation of the Association to an immediate issue, there is no doubt that sooner or later the need for such a body would most certainly have arisen.

In a modern community it is almost essential that individuals or bodies in the same line of business should have a central organisation, so that views may be exchanged, contacts made, and decisions taken on questions of common interest and policy.

The Association was accordingly formed in December, 1919, with Lord Devonport, the then Chairman of the Port of London Authority, as the first President, the late Sir Hugh Bell, Chairman of the Executive Committee, and the late Sir William C. Thorne, the convener of the old Docks Committee, as Hon. Secretary.

Office-Holders.

The following gentlemen have filled the office of President since Lord Devonport:—

Mr. Thomas Rome (Liverpool), Sir William H. Raeburn, Bt. (Glasgow), Sir Hugh Bell, Bt., C.B. (Tees), Alderman E. M. Dyer (Bristol), Mr. W. C. Bacon (Manchester), Mr. B. L. Nairn (Dundee), Sir Ernest Herdman D.L. (Belfast,) Mr. J. E. Dawson (River Wear), Sir William Crundall (Dover), Dr. Thomas Cowan (Leith), Sir Richard D. Holt, Bt. (Liverpool), The Rt. Hon. Lord Ritchie of Dundee (London), Sir John H. Irvin, K.B.E. (Aberdeen), with Sir Frederick J. West, K.B.E. (the present President).

The present Chairman of the Executive Committee, Colonel J. G. B. Beazley, M.C. has had as predecessors:—Sir Hugh Bell, Bt., Mr. C. F. Torrey, Sir Rishard Holt, Bt. and Lord Ritchie of Dundee.

The Association's Parliamentary Chairmen have been the late Rt. Hon. T. P. O'Connor, and Colonel Moore-Brabazon (now Lord Brabazon of Tara). Mr. Clement Davies, K.C., holds the office at present.

Scope.

The revised Constitution which has been amended to admit the Railways to membership sets out the objects of the Association as follows:

(a) To consider all matters affecting the general interests of Dock and Harbour Undertakers or Authorities, Conservancy Authorities or Pilotage Authorities and to make recommendations thereon.

(b) To promote, further and protect the general interests of Dock or Harbour Undertakers or Authorities, Conservancy Authorities or Pilotage Authorities.

(c) To take common action on any Public Bill, proposed Departmental Order or other measure of a legislative character that may in any way affect the common interests of Members of the Association; and

(d) Generally to consult and co-operate on all matters affecting the common interests of Members of the Association and on which it may from time to time be thought desirable to take action.

Membership.

This embraces:

(a) Every Board, Commission, Local Authority or other corporate body owning or controlling any public dock, quay or pier in the British Isles.

(b) Every Harbour, Conservancy or Pilotage Authority in the British Isles.

(c) The four amalgamated Railway Companies constituted under or in accordance with the Railways Act, 1921.

There are now actually 105 Members coming within the above definition.

Honorary Membership has been extended to the Harbours Association of New Zealand, the Interstate Conference of Australian Harbour Authorities, and the Bombay Port Trust.

The Association has itself been a Member of the British Employers' Confederation for many years.

Structure.

The Members of the Executive Committee are elected at the Association's Annual Meeting held in February, for seven districts in England and Wales, two in Scotland, and two in Ireland from nominations submitted by Authorities in the respective districts.

The Railway Companies, through the Railway Companies' Association nominate two Members to the Executive Committee.

The Committee normally meets seven or eight times in a year.

The detailed work is performed by standing Sub-Committees appointed by the Executive for the year. The personnel of the Sub-Committees consists for the most part of officials of the Member Ports, and they meet at the Offices of the Association in London.

The Parliamentary and General Matters Sub-Committee, which meets to consider Bills in Parliament and to prepare, with the help of the Association's Parliamentary Solicitor, protective and other amendments, has been the most active of the Sub-Committees in recent years.

A valuable feature of the Association's work is the intercommunication between members through the central office.

Secretariat.

To the foregoing article, we append the following personal note on the Secretariat.

Mr. W. ASHLEY CUMMINS, B.A., LL.B., J.P.

Mr. William Ashley Cummins has been Secretary of the Association since 1934, having previously acted as Assistant to the late Sir William Thorne from 1925.

Mr. Cummins was born in August 1886 and educated at Winchester College and Trinity College, Dublin. Adopting the legal profession, he was called to the Irish Bar in 1908, practising on the Munster Circuit, and to the English Bar in 1914.

During the War of 1914-18, Mr. Cummins served in France with the 2nd. Bucks. Battalion, Oxfordshire and Buckinghamshire Light Infantry and held the rank of Captain.

He was admitted as a Solicitor in 1922 and was made a J.P. for Buckinghamshire in 1940.

Notes of the Month

Death of Deputy Harbour Master.

The death is reported, in consequence of an accident, of Capt. Dugald M'Phail, Deputy Harbour Master in the service of the Clyde Navigation Trust.

New Hungarian Inland Waterway.

It is reported from Hungary that navigation on the Kuros River, a tributary of the Tisa river, was officially inaugurated in August. This increases the system of navigable waterways in the country by 128 kilometres.

Port of Hull Air Raids.

It has recently been stated by the Lord Mayor of Hull that, in spite of 84 enemy raids and over a thousand alerts, no ship at the port had ever missed a tide. Convoys, he said, had left at scheduled time and the gallantry of the dock workers matched that of the men of the Merchant Navy.

Dry Dock Company's Finances.

The profit of the Mountstuart Dry Docks Ltd, Cardiff for the year to March 31st 1943, including income from investments, dividends from a subsidiary company and after making provision for excess profits tax, amounted to £67,523 as compared with £58,546 for the preceding twelve months.

Death of Port Authority Member

The death is announced, at the age of 71, of Captain Percival Norman Layton, C.B.E., R.D., R.N.R., Elder Brother of Trinity House. Captain Layton had been a representative of Trinity House on the Port of London Authority, and was a member of the Southampton Harbour Board. For many years he was associated with the Sailors' Home and Red Ensign Club.

Dublin Port and Docks Board.

The Dublin Port and Docks Board have announced an increase in their tonnage rates on shipping arriving from abroad from 1s. 8½d. to 1s. 11½d. The dues on goods have also been raised 33⅓%. The Eirann Minister for Industry and Commerce has informed the Board that he does not favour a proposal to increase pilotage rates. He suggested a bye-law amendment to increase pilots' earnings from the reserve fund.

Dock Memorial to Governor-General.

The casket, containing the ashes of the late Sir Patrick Duncan, Governor-General of the Union of South Africa, has been placed within the Name-Stone of the new Duncan Dock at Cape Town, together with a scroll recording his public services. The ceremony, on the occasion, was strictly informal. It was attended by Mr. F. C. Sturrock, Minister of Transport, and Mr. Patrick Duncan who represented Lady Duncan.

Trent Navigation.

A meeting hs been held at Nottingham recently under the auspices of the Ministry of War Transport, attended by Sir Osborne Mance, Director of Canals, at which proposals by the Trent Navigation Company were discussed for rendering the Trent navigable between Nottingham and Tamworth, so as to enable 140-ton barges to work to a point within fifteen miles of Birmingham.

Post-War Developments in the Fishing Industry.

An International Fisheries Conference was held in London in the latter part of October to discuss the possibilities of arranging, on the termination of hostilities, an International Fisheries Convention, to replace, or, where necessary, to supplement, the Anglo-French Convention of 1839, the North Sea Convention of 1882, and the Anglo-Danish Convention of 1901. It was proposed to incorporate in any new Convention the provisions of the International Convention of 1937, dealing with the use of nets below a certain size, and the taking, landing and selling of immature fish. The proposals of the Conference are to be submitted to the respective Governments of the countries represented.

Colombo Port Commission.

Mr. H. E. P. Demel has been appointed by the Governor of Ceylon to serve on the Port Commission at Colombo as the nominee of the Ceylon Merchants' Chamber.

Proposed New Harbour Bridges at New York.

Among post-war projects in the United States are the construction of two bascule bridges over the North and South channels of Jamaica Bay at the Port of New York. The estimated cost is $1,100,000.

Port Development in New Guinea.

The newly appointed Australian High Commissioner to India, Sir Iven Mackay, stated in a speech at Sydney that in New Guinea ports had increased in number and development, and ships could now berth in at least five or six splendid harbours.

Proposed Warehouse at the Port of Gothenburg.

A proposal is before the Gothenburg (Sweden) Harbour Board to provide a sum of 3,500,000kr. for the construction of a warehouse at the Free Harbour for the use of ocean traffic. The building is to be of reinforced concrete, constructed with four storeys.

Obituary.

The death is reported of Mr. George Walter Johnson, who was the mechanical engineer in charge of the pumping plant, hydraulic cranes and lifts at the Alexandra Dock, Bombay. He was also responsible for the installation of the pumping machinery and sluice gates in a dry dock at Keppel Harbour, Singapore.

National Association of Port Employers.

Two members of the Port of London Authority, namely, the Vice-Chairman, Mr. L. H. Bolton and Mr. A. K. Graham with Sir Douglas Ritchie, M.C., the General Manager, have been nominated to serve on the Council of the National Association of Port Employers, which has been constituted to replace the National Council of Port Labour Employers.

Traffic on the Great Lakes.

The Annual Report of the Great Lakes Protective Association for 1942, shows that a new record for transportation on the Great Lakes by vessels of the United States and Canada has taken place, the total movement of essential raw materials (iron ore, coal, limestone and grain) having amounted to 178,587,397 tons. The season of navigation lasted from March 23rd until December 9th, 1942.

Institute of Transport Awards.

The Institute of Transport announce that they have accepted the offer, for a period of five years in the first instance, by Sir Alfred Read, a past President of the Institute, to provide for two annual awards namely: (a) a silver medal and £25 to a member for a paper of merit presented to the Institute on a subject dealing with coastwise shipping in relation to other forms of internal transport and (b) a prize of £25 for the most noteworthy performance (of not less than Honours standard) at the Institute examinations by a candidate who is engaged in coastwise shipping.

Tyne Improvement Commission.

At the annual meeting of the Tyne Improvement Commission in November, the Chairman, Sir Arthur M. Sutherland, and the Vice-Chairman, Col. Sir Frank Simpson, were re-elected to their respective offices. The new chairman of the Docks and Trade Committee is Mr. Henry Armstrong. Sir Arthur Sutherland, reviewing the work of the past year, said that shipbuilders had been very busy and the quays in Tyne Dock, the Sutherland Quay, Albert Edward Dock and the new quay at Hebburn were all well employed. Coal exports were down to 5½ million tons; in 1937 they were 7¾ million tons and in 1923, 21 million tons, so that they had facilities on the river for considerably increasing the export of coal.

The Coromandel Coast of South India

Sand Travel along the Coast. Wave Bars at the Mouths of Estuaries.

By J. M. LACEY, M.Inst.C.E.*

Physical Features

THE Coromandel Coast of South-east India extends from Point Calimere to the mouth of the Kistna River, a distance of some 300 miles, in a North and South direction. Its general features are those of a gently undulating plain, gradually sloping down from the Eastern Ghats to the sea, but broken through in several places by wide, shallow river valleys, thus forming a wide belt of plain, edged by the sea on the East, and bounded on the West by the Eastern Ghats.

The carving out of this great plain, and the strip of mountain wall was evidently the work of marine denudation. The massive beds of black fossiliferous clay found at varying depths below the surface, indicate that at the time the alluvium was forming, the sea must have extended to the Eastern Ghats, with outlying islands, such as the "Seven Pagodas," 35 miles South of Madras; the island of gneiss at Pudari; and the rock at the South end of St. Thomas Mount, 3 miles South of Madras, (Fig. 1).

The small extent, and shortness of the deltas of the large rivers discharging on this length of coast into the Bay of Bengal, when considered with regard to their lengths and area of their drainage basins, and the general even width of the alluvial belt along this coast, seem to point to the former existence of alluvial land considerably eastward of the present coast line. No further deltas are now forming at the mouths of these rivers. The silt carried down is swept away by current and wave action. Indeed the alluvium of which the deltas of these rivers is formed is said to be gradually yielding to the denuding action of the waves, and a constant strife between the sea and land occurs at several places along the coast. Kaveripatnam in the Tanjore district, the Khaberis of Ptolemy, was once one of the chief cities of the Chola Kingdom of South India. It was fortified and made his capital by the great Chola King in A.D. 50—59. The Cauvery river, on the north bank of which the town was built, was then a deep stream into which heavily laden ships, of that period, made their way without slackening sail. The city, once noted for its splendour, is now a small hamlet. It is probable that the encroachments of the sea have long since submerged the ancient city. In 1755, a very large portion of the Danish territory at Tranquebar was washed away. A Danish New Jerusalem Church built by the missionary Ziegenbalg is now under the sea. In the North-east monsoon of 1849, considerable inroads were made by the sea at Kaveripatnam, Tranquebar and Negapatam. From 1847 to 1855, Rs. 20,000, then a large sum, was spent in combating encroachments by the sea on the Fort and Town of Tranquebar, which had already eroded 400 to 600 feet of the Coast, (Prof. Papers, Corps. of Engineers Madras Presidency, Vol. III, 1856, "Tranquebar Beach Groins."). In 1854, the sea at Pondicherry had greatly encroached on the beach and the French government proposed to spend Rs. 40,000 in protection works.

Regarding the Coromandel coast, Mr. Bruce Foot, Geological Department of India, states: The basic rock is metamorphic gneiss; the various beds constitute a series of great foldings with axes running N. N.-East and S. S.-West. The gneiss is chiefly of the horn-blende variety. The quartz felspathic gneiss occurs in the remarkable development at Mahabalipuram or the Seven Pagodas, some 35 miles South of Madras City. Here the ridge of quartz felspathic rock, half a mile long, runs parallel with the beach, and about 80-feet above the general level of the country. At some pre-historic time, temples have been cut in the solid rock, and one called the "Black Pagoda" is now being submerged by the advancing sea. A few yards East of this pagoda is a low reef of gneiss rock which breaks the action of the surf. A noteworthy feature is the parallelism subsisting between the general strike of the beds, and the present coast line; this probably depends on the existence of ridges of corresponding strikes at small depths below the bed of the sea, by which the destruction of the alluvial formation is prevented. Two such ridges exist opposite the Black Pagoda, one close in-shore on which the surf breaks; the second ridge lies about a mile out at sea[1]. Another example of a ridge close to the shore exists at Covelong; and a similar parallelism obtains South of the Palar river, nearly as far as Pondicherry. The Seven Pagodas are geological evidence of continuous encroachment of the sea all along the Coromandel Coast (Memoirs of the Geological Department of India. Part of Madras and the North-Ancot districts).

The Tripalur Reef Lat. 12° 17′ N. is a rocky ledge which extends three-quarters of a mile eastwards of the Seven Pagodas. There is a legend that the sea overwhelmed the large and magnificent city of Mahabalipuram over the ruins of which the sea now breaks.

Shoals

Whatever be the cause, tradition, chiefly with the deep sea fishermen along the coast, states that the coast line was formerly 2 to 3 miles in advance of the present coast. Seaward shoals are prevalent along the coast especially at Negapatam, Armogam, opposite Ramipalem, and at Ongola.

A description of the Armogan Shoal, and Blackwood's Harbour is given in *The Dock and Harbour Authority* for October 1940, page 275, under "Harbours and Ports of the Circar and the Coromandel Coasts of South India." A chart of the shoal and of Blackwood's Harbour is shown in Fig. 3 on page 274 (Ibid). Early in 1800, Col. de Haviland suggested a scheme for improving the extensive anchorage in rear of this shoal, and converting it into a harbour for ships resorting to Madras and the Coromandel Coast. At the southern part of the shoal the entrance passage between it and the mainland is a mile broad of deep water caused by the set of the current past Pundi Spit, which juts out into the sea, and is formed of stiff tenacious clay. The entrance to the North is 3 miles broad. Col. de Haviland proposed to erect a lighthouse at Pundi Spit; to have a beacon light at the end of the shoal; and to raise the height of the shoal by stones thrown on it so as to more effectively stay any action of the waves on the still water behind. He stated that during Admiral Sir Henry Blackwood's stay at Armogan Shoal, the surf at Madras was so high that communication from the shore to the shipping could not be carried out even by the Masula boats,[2] yet inside the backwater of the Armogan Shoal the frigate's boats were able to land on the beach without difficulty. (District Manual of the Nellore district, 1873).

Admiral Sir Henry Blackwood having reported that H.M.S. *Leander*, had been safely at anchor inside the Armogam Shoal North of Madras for four days during the monsoons, Captain Maxfield was sent to investigate the capabilities of the place, which has since been called Blackwood's Harbour. He went there in 1822 on board the *Henry Meriton*, accompanied by Col. de Haviland, but the conclusion come to at this time, was that its distance from Madras was an inconvenience which outweighed any advantage it might have as anchorage. In 1823 however, the

*Of the Indian Public Works Department (retired).

1. Known to mariners as the "Tripalur Reef."
2. See Section on "The Surf," page 183.

Coromandel Coast of South India—continued

Madras Government hired a schooner called the *Mary Anne*, to ride out the monsoon in Blackwood's Harbour as an experiment. (A memoir on Indian surveys. C. R. Markham 2nd Edition 1878, p. 9).

Lagoons

Along the whole coast line lie a series of salt lagoons or back waters; the most noted examples are the Pulicat Lake, the Ennore Backwater, the Covelong Backwater and Marakanam Backwater. Many of the rivers as they approach the sea spread far and wide, and pour their flood waters into the sea by numerous mouths. Thus all along the coast there is a succession of shallow back waters varying in area from the Pulicat Lake, to small

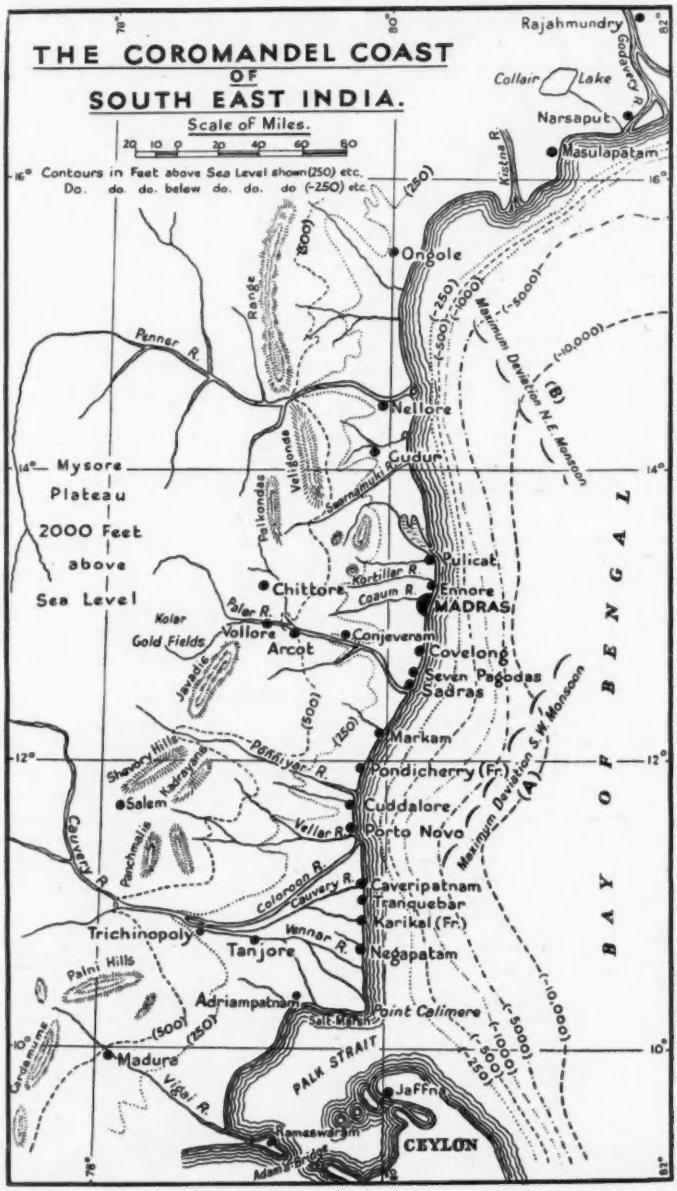


Fig. 1.

salt water marshes, usually separated from each other by strips of high land, but in other cases joined during floods, so that the country for miles together forms at such times one continuous sheet of water. A line of sand dunes borders the coast; where this is the case, the disposal of inland flood water is generally impossible except by means of the main lines of drainage.

Rainfall and Temperature

The rain-fall seasons in India are divided into:—

(1) The cold weather period, January and February.
(2) The hot weather period, March, April and May.
(3) The South-west Monsoon period, June to September.
(4) The period of the retreating South-west Monsoon, generally called the North-east Monsoon, October to December.

The rain-fall during the cold weather period is confined to North India, especially to the Punjab. During the hot weather period the temperature increases rapidly in the interior of the country, over the greater part of which hot dry land winds obtain. Land and sea breezes prevail on the coastal districts, the breezes extending further seaward, and landward, with the intensity of the hot weather. The large and rapid convective action which occurs during the hottest period of the day favours the occurrence of local disturbances. In the drier districts of the interior these storms are rainless and are known as dust storms, but in areas more affected by sea breezes, the storms are accompanied by much rain, hail and thunder.

The South-west monsoon sets in during the first fortnight of June. On the West coast of India it blows almost directly athwart the coast line, discharging a copious amount of rain on the face of the Western Ghats. In the Bay of Bengal it blows from the South-west, and passing the Coromandel Coast and the Carnatic, to which it furnishes an occasional shower, crosses the coast line to the North of the Kistna River. Between Masulipatam and Orissa the rain-fall is rather greater, but it is not until the monsoon reaches the shores of Bengal that it pours in volume into the country, causing the abundant rains of Bengal, Orissa, and Behar.

The western branch of the monsoon, after surmounting the Western Ghats, blows across the Peninsula as a West, and in some places as a North-west wind. On the face of the Western Ghats, the rain-fall is excessive, but beyond, in the table land of the Deccan, it rapidly diminishes to less than a sixth of the average fall on the West coast. On the Mysore and Bellary table land and on the Carnatic, the rainfall is scanty from June to the middle of October. To the north of the Kistna River the rain-fall is more frequent. The dry zone is limited to a strip 100 to 200 miles in width in the lee of the Western Ghats in which the rain-fall is most scanty and precarious. This part of the Deccan, together with the Mysore Plateau and the Carnatic, are most liable to drought in South India.

In the North of India, extending from Bengal nearly across India, is a broad band in which the monsoon rain-fall is more or less more abundant and more regular and certain. The rainfall rapidly diminishes to the North-west from this band, the further North, the more rapid the diminution of rain-fall, until the Put Desert, the limit of the monsoon rains is reached.

After the middle of September the monsoon ceases to carry rain to the greater part of North India. The rains last a month later in Bengal, but in the West of the Bay of Bengal, the monsoon begins to return in October, and a copious rain-fall is discharged on the Coromandel Coast and on the plains of the Carnatic. The rains of the Carnatic last until December, moving southward with the declining year. In the rear springs up the gentle steady North-east wind which gradually extends over the whole expanse of the Bay of Bengal.

A wind similar in character, but more easterly in direction takes possession of the Arabian Sea.

The statement below shows the mean rain-fall in inches per month over the Carnatic, comprising the South-eastern districts of the Madras Presidency, and forming the hinterland of the Coromandel Coast.

Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0·99	0·47	0·51	1·29	2·54	1·56	2·19	3·62	4·51	7·11	7·48	3·38
1·46			4·34			11·88				17·97	
Cold weather			Hot Weather			S.W. Monsoon				N.E. Monsoon	

Mean for the year 35.65 inches.

Coromandel Coast of South India—continued

The rain-fall along the coast is heavier. The mean rain-fall at Madras is 50.73 inches, Negapatam 54.95 inches. The coastal areas are subject at times to excessive falls of rain, due to cyclonic storms which develop in the Bay of Bengal and sweep inland. Intensities of 7 to 10 inches in 24 hours are not uncommon, (see Proc. Inst. C. E. Vol. CLXXI, p. 366, "Floods in South India.") The maximum rain-fall recorded at Madras is 20.58 inches in 24 hours on the 21st October 1846. (See pp. 104—107, Proc. Inst. C. E. Vol. CXXXIV, "Extra-ordinary flood in Southern India.").

The statement below shows the mean of daily mean temperature as recorded at Madras in degrees Fahrenheit.

Jan.	Feb.	Mar.	Apl.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
75·4	76·4	79	83·6	88·2	87·8	85·2	84	83·4	80·6	77·5	75·6

The maximum recorded temperature at Madras is 110° Fahr. and the minimum 60° Fahr.

Climatic conditions at Madras are fairly characteristic of the Carnatic. Land and sea breezes prevail which temper the heat during the "Hot" season.

Cyclones

Cyclones are generated in the Bay of Bengal at the changes of the monsoon, that is in May, at the begining of the South-west monsoon, and in October, as the monsoon begins to retreat, called generally the North-east monsoon. During the period of the South-west monsoon, cyclones are rare, except at the head of the Bay. Occasionally in May, cyclones develop in the Bay, and move usually North-westward, frequently curving to the Northward and North-eastward. In October, as the monsoon begins to retreat, cyclones of very great intensity form in the Bay and are propagated, West or North-west, sometimes curving to the Northward. The area over which the storm extends varies from 20 miles to some hundreds of miles.

The most violent and destructive storms which visit the East Coast of South India are generally formed to the South of the Andaman Islands and cross the Bay of Bengal in a West or North-westerly direction. The effect of these storms on the coast and on any structure built into the sea, depends on the path taken by the storm centre, and its position when crossing the coast. Should the storm centre pass inland North of a station on the coast,the wind at the station, as the cyclone crosses the coast will veer from North to West, thence to South-west, ending as a southerly wind as the storm passes inland. Although the wind at the station may be of exceptional strength, the effect on the sea would be a tendency to drive the waves off-shore. On the other hand, should the storm centre cross the coast some distance South of the station in question, the wind at the station will veer from North to East, and as the storm passes inland will end in a South-easterly wind. Thus the force of the wind would be to drive the sea on shore at this station, accompanied by a swell from the South-eastward, due to the disturbance caused by the advancing cyclone. The storm has thus a greater destructive effect on the coast, and on any structures built into the sea. than if the storm centre had passed inland to the North of the station.

Such storms, with the wind veering from North to East, when of great intensity, and when coinciding with high water springs, have caused the sea to rise sufficiently high to sweep inland. Pharaoh's Atlas and Gazetteer of South India, 1855, states, that during a heavy gale from Eastwards the sea has been known to rise 6 feet above high water springs; and in the hurricane of December 1807, the sea at Madras rose 10 feet above high water springs, washed over and destroyed the roadway along the coast, and Black Town, now called George Town, was devastated.

The great inundation at Coringa, near Coconada, in December 1706 was due to an easterly wind which blew hard all night, and the preceding day. The flood arrived at night. On the 20th May, 1787, Coringa experienced another inundation, which happened at spring tide, at new moon which had just passed her perigee, due to a furious gale from the North-east at the time the South-west monsoon was setting in and checking the northerly current. (Selections from the records of the Government of Madras, "Harbours and Ports of the Northern Circar").

In the memoirs of the Geological Department of India under the head of "Geological structures of the East Coast of Madras from Lat. 15°N. to Masulipatam," Mr. Bruce Foot states that great tidal waves, at long intervals devastated the eastern portion of the delta of the Kistna River as in 1864.[3]

In this connection attention may be invited to "Abnormal Tides in the Thames," pp. 178 and continued 234, *Engineering*, of the 14th August and 28th August 1936; and to "Abnormal Tides and Ocean Swell" p. 401 of *Engineering*, of 8th October, 1937, where the subject is dealt with in greater detail.

The Surf

The south-east coast of India is lined with a sandy beach, and owing to the sudden shelving shore there is a ceaseless surf. In fine weather the outer line of surf breaks about 100 yards from the beach; in monsoon and squally weather, about 150 yards from the beach, and in stormy weather, the outer surf has been ascertained to break within 300 yards of the shore. In ordinary weather, the surf wave is not above 3 feet in height. In rough weather, about 6 feet, and during a gale 12 to 14 feet in height. In severe cyclonic storms with the wind blowing hard from the East, it is difficult to distinguish the break of the surf from the high seas driving in. When land winds blow dead off shore, the surf wave is often very high but there is only one slow roller.

In addition, there is always a swell from the Southward from the Indian ocean, even during the North-east monsoon when Northerly winds are blowing in the Bay of Bengal. In calm weather during the North-east monsoon, the swell could always be experienced. It was no uncommon thing, in a boat, to feel a long Southerly swell, and a short Easterly or North-easterly chop at the same time. In this connection see Proc. Inst. C. E. Vol. CLXVI p. 63 "Durban Harbour" and Commander Jarrad's experience in 1867 in the surveying vessel *Hydra*.

This ground swell is a peculiar feature of the Coromandel Coast. Sailing directions to vessels which call at ports with open road-stead, are warned that, there is a prevailing ground swell tending, in spite of precautions, to cast vessels ashore. Vessels usually anchor in 6 to 7 fathoms, with a scope of anchor cable of 60 fathoms, and in bad weather in 8 to 9 fathoms with a scope of cable of 80 fathoms.

The Masula or Surf Boat

The surf rolling in upon the coast during both monsoons renders it hazardous and imprudent to land at any time in the ship's boat. Along the whole extent of the East coast of South India, there is an almost ceaseless surf and the Masula, or local surf boat, is peculiarly constructed to pass the surf, being a flat bottom boat, built without timbering, or a nail in its construction; the planks are sewn together with coir yarn, the work being rendered watertight by caulking strips. There are no bulk heads, and the free board has to be very high, as they have to pass through heavy breakers; in consequence the loads they carry are very light compared to their apparent capacity. Their length varies from 30 to 40 feet, 8 foot beam and 4 feet deep. A crew varying from 8 to 12 in number, perched insecurely on thwarts, far forward, provide the motive power, with long paddle sweeps not less than 12 feet in length. Steering is done with a very long and powerful paddle suspended on a coir grommet from the projecting head of the stern post. The Masula boat is esteemed the most valuable asset of the fishermen along the coast, and is used for shore seining, and also as cargo lighters. A diagram of the boat will be found in Fig.4, (*post vide* next instalment). In this connection see Memoirs of the Asiatic Society of Bengal, Vol. VII, 1918—1923, "The Origin and Ethnological Signification of Indian Boat Design," by James Hornell, and the Journal of the Royal Asiatic Society, January 1939, " The Ships of the Arabian Sea, about A.D. 1500," by W. H. Moreland.

(To be continued)

3. See p. 47, *The Dock and Harbour Authority* for January, 1942, under "Sea Waves" and Fig. 3 on p. 46. Ibid.

Notes on Seaplane Harbours

By "HELIOS."

The provision of harbour accommodation for seaplanes is likely to become an important problem in post-war development. Whether such harbours should necessarily be associated with existing ship harbours is perhaps questionable, but it is a fact that such an association now exists and there will always be a tendency to conjoin them on the ground that an overseas air line should connect fairly directly with, say, a coastal shipping route, or perhaps an ocean shipping route with no seaplane service.

Essential Characteristics.

The characteristics of an ideal seaplane harbour are roughly as follows:

(1) A calm water area, more or less circular, of sufficient diameter to provide the fastest seaplane with adequate lengths for taking off and landing, and enough depth for safe flotation, with no interfering water traffic.

(2) Surroundings sufficiently low to permit gradual ascent and descent, with long range of vision.

(3) Good road and water connection with habitations and store places for launches, cargo boats, cars and lorries.

(4) Adequate slipways, hangars, stores, repair shops and other facilities for shelter, maintenance and repair.

(5) Moorings, flare-path lights, signal lights, control, wireless station, quarters.

(6) Resthouse, with restaurant, offices, etc.

In actual fact, it rarely happens that the water area which is available possesses all the features indicated.

As regards the first characteristic, if the area selected is a long stretch such as a river or narrow lake, it must be oriented more or less to the direction of the prevalent wind and be large enough to provide a straight run of sufficient length and width between the mark buoys which determine the path, and with a safe mooring space out of, but connected to, such path.

Currents except of a low speed are undesirable, although, in fact fairly fast flowing water sometimes has to be accepted. The fact that the best direction is that of the prevalent wind means that it is also that of maximum "fetch," so that too long a stretch is undesirable because of the waves that may be produced by the wind.

The condition that there must be little or no traffic is, in itself, rather a difficulty, since a river or lake reach of a character suitable for sea-planes is *de facto* often a good navigable channel. If fixed time schedules can be established for mutual exclusion of the two types of craft, the use of the channel for both may be possible, but, in fact, the exigencies of weather make this a very difficult condition to satisfy. In a navigable river, if width suffices, it may be necessary to set aside part of the width exclusively for flying craft and rigorous police control is required to keep water craft out of it.

War-time Experience.

The war will doubtless be found to have provided a great deal of useful experience as to the lay-out of seaplane harbours, but it should be emphasized that conditions which are passable in war-time will not be permissible in peace. The competition of airplanes may be quite serious, now that such planes have proved safe for long overseas trips, and it is probably true that land craft can safely take off and alight in aerial conditions which are quite hazardous for seaplanes. While it is probable that the capital cost of a seaplane harbour is appreciably less than that of an aerodrome (owing to the cost of the runways etc.), it seems possible that the results may not be quite so satisfactory.

Landing Facilities

Strong endeavours have been made to make the embarkation and debarquement more comfortable by the provision of direct landing pontoons, large swift launches, etc, but there will always be an element of discomfort arising from the (often) greater distance to the seaplane harbour and the necessity which usually arises of a fairly long boat trip to the seaplane moorings. These may seem small matters, but combined with the somewhat increased hazard of take-off and landing, which shows itself in a greater disturbance of time tables by weather, it is clear that the designer of the seaplane harbour has many awkward problems to consider in providing facilities which will attract passengers.

As to freight, there is less difficulty, but the risk of water damage has to be considered and the handling of heavier packages is more difficult at a mooring than on land. As the seaplanes become larger, these problems become aggravated.

Influence of Water Channel.

Especially important are the physical limitations of the water channel. If it happens that development involves increased landing and take-off speeds, the dimensions originally provided may be inadequate, and enlargement is, or may be, most difficult, whereas in an aerodrome it is often quite possible. Command of the shores to prevent the erection of high obstructions is necessary. Still another aspect of the matter is that such harbours are necessarily in low places, whence distant visibility may not be possible, while aerodromes may be on plains or even plateaux with wide horizons.

For all these reasons, there may be a tendency for seaplane harbours to be developed in unsettled areas, and later to be supplanted by aerodromes. Whether this is a general trend is a matter for study. The advantages of flight depend on speed, and it is very doubtful if the seaplane can hope permanently to rival the land plane in this respect.

The Institution of Civil Engineers

Abstract of Presidential Address of David Anderson, LL.D., B.Sc. (President 1943-44)

Both the last war and the present war have been accurately called "Engineers' wars," but the skill and ingenuity that have been used for purposes of destruction can and should be applied to reconstruction and improvement in times of peace. The whole of the amenities of modern life are the results of planned and applied engineering. The work calls for energy from both old and young, and it is hoped to raise afresh the old problem of how the younger engineer may be more closely linked with the work of The Institution.

Descriptions are given of planning in Soviet Russia, Germany, Italy and the United States. In Great Britain the machinery of government is complex, comprising, under the Crown, a combination of Parliament, Ministers and the Civil Service. Nowhere in this structure is there machinery for planning ahead.

Owing to the changes in modern life some 10,000 specialists or experts have had to be brought into the Civil Service machine to deal with technical matters. In practice they are not allowed to ascend to the highest administrative posts and they do not have direct contact with the Minister. The Post Office has abandoned this system, partly owing to the fact that it is a revenue-earning Department and partly owing to the importance of scientific developments in its Engineering services.

The advantages and disadvantages of planning are reviewed, and a programme of planning is suggested, covering the rebuilding of towns damaged by war; home and empire communications; the distribution of labour; handling and distribution of food; the armed forces and the merchant service, in peace and war; the husbanding of natural resources; chemical engineering; and research. Suggestions are also made for the formation of a Joint Planning Centre to study these matters and the many others that would arise; for the education of public opinion by the technical Institutions by lectures, articles, books, and broadcasting; and for a greater representation of Universities and Colleges in Parliament.

Finally, the spiritual side of Planning is emphasized, and engineers are urged to keep high ideals and high standards before them, so that they may not only "direct the great sources of power in Nature," but also direct the forces of Human Nature into right channels.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this Journal should not be taken as an indication that they are necessarily available for export.

Dockside Participation in the National Rat Campaign

Use of a Special Grade of Arsenic

By ERIC HARDY, F.Z.S.

The greatly increasing number of rats in the towns and ports of this country has led the local authorities to make a survey of their respective territories and this is being done in connection with the national campaign to reduce the rat population. The matter is one of special importance to port authorities who are the custodians of foodstuffs. The Infestation Branch of the Ministry of Food recommends the use of arsenic, for the purpose of poisoning the rats, and this raises many problems at warehouses and on dock premises where food and domestic animals may come in contact with the poisoned baits. Most port ratcatchers have, for years, shown preference for such popular rat baits as ham, oats, fish or fatty foods, and for poisons they have preferred red squill biscuits, barium carbonate, chemical fumigants, and for quick results, "biological poisons" in the form of a virus.

There is a prejudice in many quarters against the use of arsenic for rat poisons, but its great advantage is that it is cheap compared with most other powerful chemical poisons. Phosphorus is a very effective rat poison but it is often condemned, as in the Ministry of Agriculture leaflets, for being too dangerous. Red phosphorous is not nearly so dangerous (e.g. spontaneously inflammable) or poisonous as yellow phosphorus. But it is very expensive.

Strychnine is the most effective poison, although very inhumane and it is the basis of the success of American vermin control, but here it is generally held to be illegal. There is however brucine, one of the strychnine alcoloids, which is not so dangerous.

One of the reasons for the prejudice against arsenical rat poisons is that much of the arsenic ordinarily available has proved disappointing in rodent control work. But, to remedy this, the Ministry of Supply has allocated a special grade for rat control purposes, which possesses the necessary degree of purity to ensure its effectiveness as a bait and the minute particle size necessary for high toxicity. This arsenic is coloured in accordance with the Poisons (Colouring) Rules, 1936, with a water soluble dye called chlor-azol blue, which does not affect palatability with respect to rats. Wholesale supplies of the coloured arsenic can only be obtained through eleven firms (which are members of Arsenic Distributors Ltd., Granite House, London, E.C.4). A list of these authorised members appeared in the *Pharmaceutical Journal*, 31st July, 1943, page 45.

Fortunately, very small quantities of arsenic in sweetened bait will prove effective with rats. This is because rats seem not to have any ability to vomit the poison as other animals generally do. But it must always be remembered that the maximum arsenic toleration of the human body is only 1/12 grain, so that constant attention should be given to avoiding all risks of contaminating food or handlers.

In a paper on the chemical control of pests delivered to the Royal Society of Arts, this year, Dr. R. E. Slade, Research Manager of Imperial Chemical Industries, pointed out how the rat requires different chemical means for its destruction when it lives in stacks, barns, rubbish heaps and warehouses, than when it lives in holes underground. He mentioned red squill as generally the best poison for the well-known method of feeding rats regularly for several days at certain spots and then one day to poison all the food put down at these spots and thus obtain a 90% kill. But as red squill powder is an imported product—the dried and powdered bulbous root of a plant from the North African coast—it is in short supply. The poison is called scillitoxin, which can now be extracted from the root.

Dr. Slade also mentioned such stomach poisons as arsenious oxide, zinc phosphide and barium carbonate, which are more dangerous where domestic animals or food may contact the poison. The first two poisons named are believed to be fairly safe to cats, but not the latter one.

It was recently announced that the Ministry of Supply is recruiting cats in order to cope with the rats and mice at the country's various food stores. The value of cats is often overestimated because there is the temptation to feed the cats, and a well-fed cat will not usually hunt mice and rats but merely kill those that come its way. And where cats are kept in warehouses, where they are not specially fed but left to hunt for their food, they are generally enticed away to some local canteen or abode for an easier living. The perfectly unnecessary habit of feeding cats daily with saucers of milk tends to curb their hunting. A good hunting cat should be given ample drinking water daily, but if the building is infested with mice and rats it should be left to hunt down its own food as its wild ancestors fed, and then there would be an effective result; but when the cat or cats have reduced the rodent population they will wander away to hunt their prey elsewhere unless restrained by feeding. Persistent, well-organised hunting with ferrets, or beating-out to terriers, are generally more successful methods of rat catching; but a pair of cats with a litter of kittens to feed would prove most effective upon a warehouse rodent population.

In rural buildings, owls should be encouraged to nest in the upper storeys by leaving open permanently windows or hoisting spaces 20 or 30 feet above the ground, out of the reach of rats, yet giving barn-owls access to nest behind inner rafters. Or large owl nesting-boxes can be erected 20—60 feet up any large trees adjoining the warehouse. This is particularly useful with grain stores. If there are any gamekeepers employed locally an effort should be made—by examining their gibbet—to see that no tawny owls or white barn-owls are illegally shot, and that the alien little owl, the kestrel (which is often mistaken for a "sparrow-hawk"), the stoat and the weasel are left unmolested to carry on their useful, natural work as the greatest rat and mouse catchers of the English countryside. For wherever there is a large food store in rural districts it will attract rodents from a very wide area. Such a rural district often forms the environs of a small harbour or a canal-side warehouse.

Some interesting experiments of breeding the black ship rat in confinement have been in progress to determine their annual rate of increase, their age limit, age of maturity, rate of growth and the weaning date of their young—factors in their natural history which are essential for their control, but not so fully known as in the case of the brown town rat. A Yorkshire naturalist recently made some interesting observations on black rats in captivity from the London docks, wherein the female rats exhibited a remarkable care and affection for their young.

In the case of wartime agricultural committees' efforts to control the brown rat, oatmeal has proved to be the most efficacious of all baits when poisoning operations were in hand. Waste saved from pigs has also proved especially attractive bait to rats. The brown rat is larger and heavier than the black rat, but relatively few rat-catchers have caught a brown rat weighing over 32-ozs., while any rat over 16-oz. is a "specimen." The heaviest recorded rat weighed 44-ozs., but it was killed so long ago as November, 1896.

Rats have even been found aloft in aeroplanes, as well as travelling in goods trains, and the war's tropical shipping routes and crowded cargoes are all favourable to the spread of the climbing black rat and its various sub-species.

The Department of Agriculture for Scotland has shown preference in its wartime work of rat control for the following methods of poisoning:

(a) Red squill powder, black treacle and water.
(b) Red squill powder, oatmeal (or finely chopped cheese rind or fish heads), and dripping (cold fat).
(c) Red squill extract mixed with bread and milk paste, and
(d) Barium carbonate powder, oatmeal and margarine, or dripping fat.

There is truth in the old slogan that "a rat in March saves nine," and wherever the presence of a female rat is discovered, or suggested by the capture of young rats, the size of the baits should be doubled, for she has the bigger appetite.

Dockside Participation in National Rat Campaign

(continued)

It has been found that baits are best laid down in the late afternoon or evening, generously applied, say ten lots of bait per rat, and wrapped up in paper like children's sweets to arouse the curiosity of the rats which might otherwise leave them alone. The consistency of bread pastes should be porridge-like to curb the rat's tendency to take them away, for rats and mice are notorious hoarders.

Baiting with poisoned food should be carried out according to a definite plan. If placed in the haunts of the rats, the bait will be taken immediately; it should therefore be replaced each day until some is left—showing that the rats have had their fill. Operations should now be suspended for a week and then the second phase practised. The subsequent phases are carried out in like manner but there should never be more than a month between any phase, so long as rats are present. The Department of Agriculture for Scotland has had more success with red squill powder than with the extract, and phosphorous and zinc phosphate have also proved successful poisons.

A Proposed National Transport Trust

In a Paper read before the Institution of Civil Engineers on November 23rd, Mr. B. D. Richards, B.Sc., M.Inst.C.E., put forward a proposal for the creation of a National Transport Trust.

After setting out an outline of the existing transport system, he went on to say that his object was to secure a co-ordinated system with the minimum dislocation of existing units, the method being the linking up of the various systems by means of financial control exercised by a Transport Board, operating as a Trust.

It is proposed to include the following units:

1. Railways.
2. Classified Roads.
3. Canals, excluding Ship Canals.
4. Coastal shipping ports and parts of ports owned by, or leased to, coastal shipping services.
5. Motor road passenger transport services.

The following services should be independently owned and operated, but should be subject to a measure of regulation as regards conditions of working and rate tariffs.

6. Motor road goods transport.
7. Canal shipping.
8. Coastal shipping;

and included, or otherwise, as may be determined later, should be;

9. Airports.
10. Air passenger services. } Internal services only.
11. Air goods transport.

The units to be definitely excluded are:

12. Local passenger transport services within town limits, operated, or regulated, by local authorities.
13. The London Passenger Transport Board and any similar amalgamation of local passenger services in densely populated areas, that may be formed.

The general principle is that each branch of transport would be divided into regional groups (the four main railways form natural groups), each of which should be self controlled as regards operation, thus decentralising executive functions.

The regional groups of a branch should be co-ordinated by a Board or Joint Executive Committee for each branch.

These branch boards would be as follows:

1. Railways Joint Executive Committee.
2. Roads Board.
3. Canals Joint Executive Committee.
4. Coastal Shipping Ports Board.
5. Roads Passenger Transport Board.
6. Licensing authority for motor vehicles.
7. Air Transport Board.

Representatives of each of these Boards would form a Transport Council with an independent President and Vice-President.

The primary functions of the Council would be the co-ordination of the Branches and the control of finance.

The objects of the Transport Council would be to secure that each transport unit should serve the specific purpose to which it is adapted to eliminate all competition between or within the units: to develop and operate transport as a national utility and to safeguard the interests of the public. Control would be mainly exercised through the tariffs and licensing system and the constitution of the Council implies that it would be in a large measure a co-ordinating body.

The whole undertaking would be vested in the Trust, the capital being furnished by the issue of stocks or bonds carrying fixed rates of interest.

Of the seven branches included in the Trust, five (including air transport) are revenue-earning and spending units: one (roads) is a spending unit only: and one (Licensing authority) is revenue earning only.

All net profits would be paid into a central pool controlled by the Transport Council and would be devoted to:

1. Service of bonds and interest on stock.
2. Expenditure on extensions and improvements.
3. Reserve fund.

Any excess would go to the reduction of rates and tariffs.

Each spending branch would prepare annual budgets of capital expenditure which would require to be approved by the Transport Council in the exercise of their function of controlling finance.

Adjustments of rates and tariffs would be similarly subject to approval.

The Transport Council should be granted very wide powers which should include the right to raise capital and to vary tariffs, within statutory limits.

The finances of the Trust should be independent of the National Exchequer and any contribution to the latter should take the form of an annual payment of a fixed percentage on the issued capital of the Trust.

The essential principles involved are:

1. Centralisation of financial control.
2. Decentralisation of executive control.
3. Utilisation to the fullest possible extent of the existing machinery of administration of the various systems.

If these essentials are maintained, it is considered that, the Trust, vast though it would be, should prove workable and efficient.

Retirement of Port Official.

Mr. A. J. Lloyd, Secretary of the Port of Bristol Authority, has retired on superannuation and on October 29th, a representative gathering of members of the Port of Bristol Authority, Corporation Officials, Dock Officers and Staff, assembled in the Board Room at Queen Street, Bristol, to take formal leave. Mr. R. H. Jones, the General Manager presided and spoke in highly appreciative terms of Mr. Lloyd's service. Mr. Lloyd was presented with a silver tea set as a mark of esteem from his colleagues.

Mr. Lloyd entered the service of the Bristol Docks Committee in January, 1904, and has occupied the post of Secretary since the retirement of Mr. D. Ross-Johnson from the General Managership in October, 1928. Mr. Lloyd's successor is Mr. W. G. Neale, hitherto his deputy, who has been at the Docks Office since 1920. Mr. J. A. Philpotts has been appointed accountant.

Strike of London Dockers.

In the closing days of October there was a strike of a group of dockers on Thames-side due to a claim for extra money for handling explosives, work which the dockers considered dangerous. Troops had to be brought in to carry on essential operations. After wasting several days in idleness, the men returned to work on November 4th and the question of extra payment has since been submitted to official enquiry, the result of which had not been announced up to the time of going to press, though it is to be expected very shortly. The strike was carried out against the advice of the men's Union.

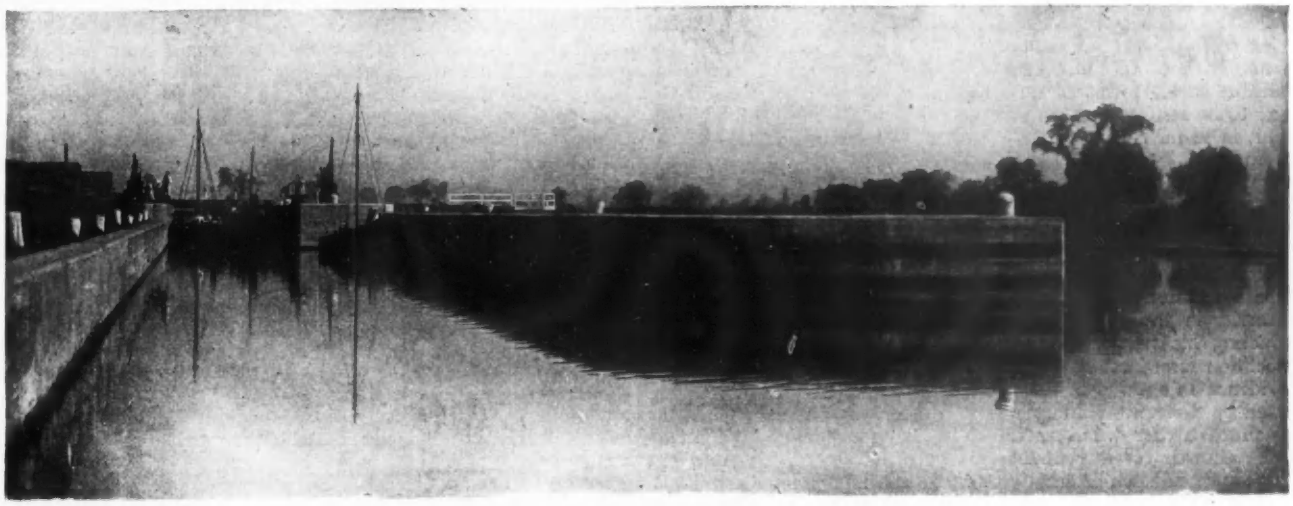
*The Economic Future of Canals and Inland Waterways**

By W. FRASER. M.A., Secretary and Traffic Manager, Trent Navigation Company.

(Concluded from page 166)

Carrying Services

While the ownership of a canal is a natural monopoly and can be vested readily and conveniently in a Public Trust, the carrying services are operated by a considerable number of owners of small and large fleets and it is suggested that this activity is not suited for State enterprise. Public control is usually rigid in administration and inflexible in operation, and these attributes are not disadvantageous to the ownership and provision of an efficient track. On the other hand, the canal carrying trade requires the attributes of private enterprise—healthy competition between carriers, quick decisions, speculative enterprise, progressive development and a driving urge to solicit new business.



New Lock on Trent Navigation.

In his address at the annual meeting of the Association of British Chambers of Commerce held on the 5th May, the President, Mr. Henry Morgan, said: " Nothing will be more vital to the well-being of the country after the war than a thoroughly efficient and economic transport service in which all forms of transport will play the parts for which they are best suited. That this aim can be best achieved by the retention of that spirit of initiative which private enterprise alone can provide, I am fully convinced."

If therefore the canal industry is reorganised on the lines which have been suggested, the prospect in view is that of efficient and well-maintained waterways owned by Public Trusts, the prime object of the Trusts being " service " and not " profit," and the use of the track being available to carriers and traders alike. The Trusts should not be permitted to carry and to conduct the business of carriers, but it might be advisable for some procedure to be laid down whereby, after full enquiry, a Trust would be able to obtain powers to carry if it could be shown that such a course were necessary top reserve the facility of water transport in any area.

The position of the canal carrier (usually termed the " Bye-Trader ") is in some respect analagous to that of the road haulier in that he operates on a highway over which he exercises no control and in which he has no financial interest. But whereas the haulier pays an annual licence fee for the right to use the highways for his vehicle, irrespective of the tonnage carried per annum, the canal carrier is obliged to remit to the undertaking a toll on every ton conveyed by boat. The larger the annual tonnage carried by a road vehicle the smaller is the licence cost per ton, but the canal carrier's toll per ton does not vary whether he conveys 100 tons or 1,000 tons per annum.

A road haulier pays an average sum of .12d. per ton mile in respect of the annual licence for a lorry with a carrying capacity of 15 tons. The toll paid by a canal carrier varies according to the waterways on which he operates and, taking the alternative routes to Birmingham which form the four Arms of the Cross, the following were the average toll charges per ton mile in 1939:—

Regent's Dock to Birmingham	.33d.
Hull to Tamworth	.34d.
Mersey to Birmingham	1.00d.
Sharpness to Stourport	.80d.

In other words the contribution per ton mile which canal carriers on these routes have to make towards the provision and maintenance of their permanent way varies in amount from three to eight times that made by the road haulier. The canal carrier's position, vis-a-vis his road transport competitor, is greatly prejudiced by the incidence of these charges, for to take one example, in respect of a recorded normal year's working of a 100-ton boat between Hull and Nottingham, which travels at a speed of 5 miles per hour approximately, the total tolls paid to undertakers amounts to about £370, whereas the annual licence paid by a 15-ton lorry with a maximum speed of 20 miles per hour, is £110. The carrier pays over three-and-a-half times the annual tax of the lorry, but executes only 50 per cent. more work as measured in ton miles.

If the carrier is to compete economically with road transport the present method of levying toll charges should be cancelled and the contribution required from him towards the expense of his track should not be at a higher rate per ton mile than that demanded from the road haulier.

A more equitable arrangement would be the charging of a suitable annual licence fee for each boat. Thus a strong incentive towards increased work and efficiency on the part of the carrier would be provided, and control could be exercised by a competent authority to ensure that boats are maintained in good and efficient

*Paper read before the Mansion House Association on Transport.

Economic Future of Canals and Inland Waterways—continued

repair and that proper wages and conditions of employment are vouchsafed to canal employees. In the past there has been no such control and on occasions the interests of both the carrier and the trader have suffered accordingly.

In this connection it is suggested that the trade of the community would benefit if all three forms of transport—water, rail and road—were placed in equality, so that in computing a conveyance rate the element to be included to represent interest on track capital and cost of track maintenance should be common. It should not be impossible to ascertain the sum required by the railway companies from their traffic in order to service the effective capital expended in creating their track and in executing proper maintenance. The total payment made by by all forms of transport in respect of the use of their respective tracks might be pooled If this arrangement is effected, the rates of all forms of transport should be maintained up to an accepted standard of efficiency. If this arrangement is effected the rates of all forms of transport could conveniently be based on out-of-pocket cost of work and the trader would be free to employ the more expensive form of transport if the improved service is worth the additional cost to him. Each form of transport would thus be able to attract to itself the traffic for which it is most suited.

Whatever the State may decide as to the future rates structure applicable to all forms of transport, it is essential for the canal carrier to be assured that he is in no worse position than his competitor, in so far as this prime ingredient of his conveyance rate is concerned.

At present the economic capacity of many canal carriers is low. Apart from the very heavy contributions which they have to make in the form of tolls and dues to canal undertakings, which are often not less than 25 per cent. of their total receipts, the ratio of their operating costs to their receipts is about 70 per cent. This has been occasioned largely by the railways discriminating against the carrier in the quoting of rates with the specific intention of abstracting his traffic. The position became acute when road competition forced railway rates still lower. There is a good deal of evidence to show that the percentage reduction from standard allowed by the railway companies for traffic between two points is very much higher when an inland water transport route exists, than is allowed for the same traffic between two equally distant points where no such alternative route is available. It is essential that this usage, and also the custom of the railway companies of subsidising port railway traffic from non-port railway traffic, should cease. These practices are most unfair to the trading community as well as to the carrier.

It is usual for goods ex ship to be discharged direct to quay and to small craft simultaneously, but the small craft are frequently discharged to rail wagon at another berth in the port instead of being dispatched inland with their cargo intact. This extra handling at the port costs money, but the railway companies levy no charge for this service—they subsidise the dock lighterage costs out of their non-port freight rates so as to neutralise the natural advantage accruing to inland waterways.

It is not in the interests of the trading community and it was never intended by Parliament that the railway companies should give preferential treatment to certain traders because their works happened to be situated adjacent to a canal and their traffic passed to places served by an inland waterway, but it is abundantly clear that the presence of an inland waterway route has depressed the level of railway rates in that area while leaving the charges payable by those traders outside the range of the waterway on a plateau. In the post-war alignment of transport the canal carrier asks for no preferential treatment, but he demands that legislation will not permit his position to be prejudiced and undermined by his competitors.

In the matter of conditions of carriage of all forms of transport there is a need for standardisation and this applies particularly to canal carriers who are subject to no regulation as to the conditions on which they carry goods. But standard conditions can be drawn up and enforced which would be fair to the trader and afford the minimum amount of protection required by an inland waterway carrier, bearing in mind the nature of the business of inland waterway conveyance. Attention is called to the precedent created in the case of coastwise shipping, where the law in respect of the carriage of goods by sea is now governed by the Carriage of Goods by Sea Act, 1924. In this matter, consultation between the National Association of Inland Waterway Carriers and the Mansion House Association would be of great value.

Canal carriers specialise in the conveyance from the ports of bulk consignments, storage at inland warehouses operated by them and subsequent delivery of any quantity to merchants' individual customers. A special study of warehousing and distribution has been made in the belief that the manufacturer or trader with stocks located near to his customer generally effects a prompt sale. For any trader not having a branch office or warehouse in the territory in which the waterhead is located, this facility offers appreciable economies, as it is tantamount to the establishment of a local branch for the trader, but without overhead and other charges Canal carriers also arrange for the assembly in their inland waterway warehouses of consignments for export and their delivery alongside ship.

Auxiliary Road Transport Services

To develop the distribution and assembly of bulk stocks it is essential that canal carriers be permitted to own and operate adequate collection and delivery road transport services. The Licensing Authorities set up under the Road and Rail Act, 1933, have laid down the principle which has been confirmed by the Appeal Tribunal " that collection and delivery of goods could be better co-ordinated with the railway services and be more efficiently carried on by the railway company with vehicles owned by them and under their control rather than by their employing others to do that work." The Tribunal also said: " we see no reason why a road haulier who operates a regular trunk service should in principle be treated differently from a railway company with regard to the question of vehicles for collection and delivery." A principle which is good for a railway company and for a trunk road operator should also be good for a water carrier. Sub-section (2) of Section (2) of the 1933 Act, gives power to a canal undertaking to deliver goods from their canal or collect them from their customers on an " A " licence, but it is doubtful if most of the existing undertakings have power under their private Acts of Parliament to apply their funds to the carriage of goods by road. However, it is more efficient and the work of collection and delivery can be better co-ordinated if the road transport vehicles be owned and operated by the carrier who would thus have the control and supervision of consignments from door to door. Therefore, so long as canal carriers can show to Traffic Commissioners the need for " A " licences, these should be granted automatically and carriers should not be obliged to have to engage in expensive litigation to fight objections, often unsuccessfully, from railway companies and road transport operators.

In its own sphere inland waterway transport offers unique advantages to the trader. Vessels can receive cargoes from ship or unload to ship direct overside, and where craft can approach a vessel lying in an estuary, lighterage, dock and warehouse charges are eliminated. The facility of being able to collect large cargoes direct overside also assists in speeding up the turn-round of ships and in the elimination of congestion at docks. By the use of inland waterway transport for large consignments, greater economies are effected than if road transport vehicles were utilised.

To collect and convey by boat a consignment of, say, 400 tons from a steamer, four vessels are required, manned by a crew of nine men, and such a flotilla will travel at the rate of 5 miles an hour approximately. To collect and convey the same quantity of goods by lorry would require 27 heavy 15-ton vehicles, manned by 54 men, travelling at an average speed of 15 miles an hour. If the goods were to be conveyed a distance of 90 miles, 162 man hours would be required in the case of the waterway conveyance, while road transport would require 324 man hours.

A comparison of the fuel consumption of 100-ton standard inland waterway craft with that of heavy road transport lorries is revealing. A Diesel-engined road vehicle consumes 1/12th of a gallon per mile while conveying a pay-load of 15 tons and therefore performs 180-ton miles per gallon. A Diesel-engined cargo carrying and towing vessel with a normal train of dumb boats con-

Economic Future of Canals and Inland Waterways

(continued)

sumes 1¼ gallons per mile while conveying a pay-load of 650 tons, and therefore performs 520 ton miles per gallon. Thus in affecting the movement of goods in substantial quantities the amount of fuel consumed per ton mile by heavy road vehicles is three times that used in the case of 100-ton inland waterway vessels. In practice, however, owing to the greater lack of balanced loads on the waterways this saving in fuel consumed per ton mile is not attained completely.

The average English inland waterway costs less to maintain than a first-class road or a main line railroad. On a canal there is a lower resistance to haulage, a less amount of dead weight hauled and greater degree of safety for cargoes carried.

Inland waterway transport is vital to the community. While road transport continues to extract an appalling toll of human life and limb annually, and accidents involving loss of life do take place on the railways, deaths resulting from the movement of goods by canal are exceedingly rare. In calculating the comparable cost to the community of all forms of transport, surely considerations of this kind must be taken into account.

Ports and Coastwise Shipping after the War

Statement by the Minister of War Transport

The subject of post-war transport was debated in the House of Lords, on October 27th. In the course of the debate reference was made by the Minister of War Transport to the situation as regards water-borne traffic and the necessity for a coaster fleet, without which the internal transport system of the country would be seriously hampered. He said, that docks and harbours were an important link in the transport chain and that the dock industry should be given the best opportunity for service.

Export Trade

Speaking about export trade, Lord Leathers said that after the war we shall, as never before, be dependent on export trade, not only for our prosperity but for our survival. "In all considerations of these problems I have in the forefront of my mind the need to give every opportunity to trade, by means of really efficient cheap services, at the lowest cost to the community as a whole." Whatever the merits of competition in stimulating enterprise and efficiency, it must be evident that if it were carried so far as to undermine the stability of services essential to the community and the commercial interests, its effects would ultimately prove damaging to the national interests.

There was room for improvement in the co-ordination of coastwise shipping, and other forms of inland transport. Means must also be found for making the maximum economic use of the canal system. The war had made it clear that the railways were a national asset which must be maintained in full efficiency. This was absolutely necessary not only for trade and industrial purposes but for defence. From this it followed that the financial position of the railways must be firmly established. We could not allow such a vital service to be starved of proper maintenance and improvements owing to shortage of funds or inability to raise new capital. This could be done by placing the credit of the Government behind the railways by nationalisation, and also by creating conditions by which the railway companies could operate on a reasonable profit margin.

We could not do without a coasting fleet, continued Lord Leathers. But for the relief they had given to the railways our transport system would have been seriously blocked. These ships had the greatest mobility. They could be put in where the strain was heaviest. They had in particular been invaluable in distributing ocean cargoes through the smaller ports. Experience of the war had underlined the advantages of close co-operation between the various forms of transport enabling traffic to be allocated according to the availability of means. We must be careful in planning the co-ordination of road and rail to see that nothing was done to prevent coastal shipping performing its functions.

The co-ordination and possible amalgamation of the Channel Packet services was being examined by the railway companies and certain coastal lines were pursuing schemes of consolidation which he hoped would lead to improved services and a reduction in the operational costs.

The Canal System

The place of the canal system in our future transport system was less easy to determine. Some canals must be used to the limit of their capacity, but it might prove desirable to abandon certain other waterways originally provided to serve industries which had either declined or removed elsewhere. Docks and harbours were an important link in our transport chain.

We must see that the dock industry was given the best possible opportunity for service. Ports must not indulge in cut-throat competition which diverted trade from its real channel, but their charges must be kept low by efficient management and proper equipment. The course of the war had seriously disturbed the balance of our ports, which had experienced loss of trade and consequent financial embarrassment. Discussions were taking place between the railway companies and the Dock and Harbour Association to aim at securing greater co-ordination between all dock and harbour undertakings, and the railway companies were in the process of becoming members of that Association. This was a welcome development, and the process of co-ordination would be helpful in building up post-war policy.

Turning to the air, he said our island was so small and train services between the main centres of population so good in peacetime that scope for internal air services was necessarily limited. But there would be a number of services, many including short passage over the seas, for which the air was eminently suitable. The main problem arose in the proper siting of air ports and providing proper rail or road approaches. The primary purpose of his Department was to weld the various forms of transport into one articulated engine for waging the war. "We shall not be daunted by the complexity of the issues or the magnitude of the interests involved," he concluded. "Just as soon as I am satisfied that all the relevant facts have been fully considered we shall not be timid or have any hesitation in making our decision."

The Ports of Southern Ireland

Serious Financial Position

On October 23rd, a Conference was held in Dublin, which was attended by representatives of all the port authorities in Eire, except those of Dublin and Waterford. Mr. C. C. Copeland, Chairman of the Galway Harbour Board, presided.

The object of the Conference was to consider the present unsatisfactory position of ports and shipping in Southern Ireland and to make suggestions for their betterment. It was frankly admitted that the ports were practically all in debt. The Chairman said that they were being forced to live on capital, or borrowed money. Their liabilities at the end of the war would probably run to thousands of pounds.

Mr. L. Walsh, of the Drogheda Harbour Board, claimed that the state of affairs was largely due to the centralisation of exports by shipping cartels. His remedy was to create shipping to carry the surplus products of Eire to all the ports of the world. Senator Mrs. Concannon pointed out that the aeroplane was going to play a big part in transport in the future, and advocated that harbour boards should be charged with the development of air-ports.

On a suggestion for an appeal to the Government for financial help, Mr. W. T. Cosgrave, former Premier of Eire, warned the Conference that when local bodies approached the Government for grants, certain conditions were imposed with the grant which might not be altogether welcome. He thought it would be a pity to have state control of ports and shipping.

Ultimately, it was decided to set up a Harbour Council to deal with the problems generally. This was intended to be a permanent body.

*Coffee and its Association with the Port of New Orleans, U.S.A.**

By T. J. CONROY, Vice-President, Mississippi Shipping Company and a Member of the Port Advisory Committee of New Orleans.

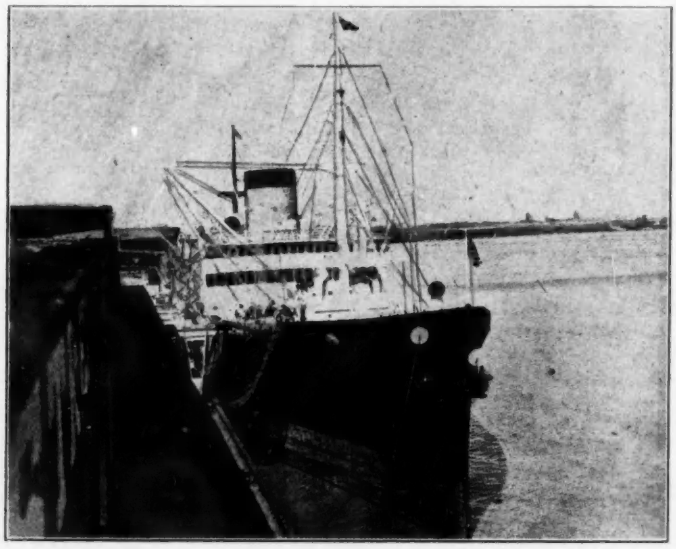
Early Uses

WHEN it is considered how important a part coffee plays in our national life, it is indeed interesting to go back a few centuries and study its early history. Coffee was first used as solid food, later as wine, then as a medicine, and finally as a drink. As food, the berry was crushed and fat added, the mixture being moulded into a spherical shape, about the size of a billiard ball. This was a man's nourishment for one day. To this day some nomad African tribes use coffee in this form as food. The next method adopted was to make a wine with the coffee berry, through the fermentation of the husk and pulp. This was followed by pouring boiling water over the dried husk. After that, the roasting of the dry bean mixed with the husk was started, out of which a decoction was prepared. It was much later that the practice of reducing coffee to a powder in mortars was established.

Legends

The most widely-known and often repeated legend is that of an Arab goatherd, who noted that his goats, after eating the leaves and fruit of a certain wild shrub, became animated and more agitated than usual. The goatherd experimented to see what effect the fruit would have upon himself and was much pleased with the results. He related his experience to a monk of a monastery in the vicinity, explaining to him the sensation of contentment that he had experienced. The monk, in turn, ate the fruit and experiencing the same peculiar effects of stimulation, prepared a decoction of the beans, which was served to other members of the religious order and enjoyed by all.

Another widely-spread legend is that of Sheik Omar who was exiled to Ousab in the Arabian Desert because of dissension with his superiors. Abandoned without food, to keep from starving Omar ate herbs and fruit he found near at hand. The attractive berries of a certain shrub were a temptation to him. Eating them, Omar felt as one re-born, experiencing a state of good health which he had not enjoyed before. He attributed magical properties to the strange plant. By washing the beans and boiling them in water, the results were even better. He gave the miraculous potion to sick people, which eased and cured pain and weakness. It did not take long for news of the new panacea to be known. The retreat of the exile became the centre of pilgrimages and his fame was such that Omar, not long after, was asked to return to Mocha and entered the city in triumph amid the enthusiastic applause of the people.



Unloading Coffee at the Port of New Orleans.

A "Toter" or Negro Coffee Porter at Port of New Orleans.

Development of Production

Coffee, which in the beginning was the privilege of the holy, soon crossed the boundaries of monasteries to become the drink of the common man. It is generally recognised as having been first known in Ethiopia as it is a native plant of that country and grows wild there even to-day. The coffee tree was transplanted to Arabia in the fourteenth century where the drink made of its fruit was received with great success. From Arabia, it was transplanted to Egypt, then to Turkey, where in 1554 the first public coffee house was opened. It appeared in Venice in 1615, in France in 1644, in Austria and England in 1650 and in the American Colonies in 1668. William Penn was one of the early coffee consumers in the Colonies and paid several dollars per pound in those days for the green bean.

The first coffee house in London was opened to the public in 1652 and thereafter the use of the drink spread throughout the world.

First Cultivation of Coffee

The Arabs were the first growers of coffee and used every means at their command to prevent its introduction into other countries but they were unsuccessful. In 1640 the Dutch were already studying the possibility of its cultivation. Coffee plantations were very prosperous in Java during the year 1696 and the first samples of coffee were received at the Botanical Gardens of Amsterdam in 1706. In 1714 the Dutch introduced the plant in Surinam (Dutch Guiana), the earliest known record of its cultivation in the Western Hemisphere.

From Dutch Guiana coffee spread to the West Indies, then to French Guiana, from whence it was brought to Brazil, and was

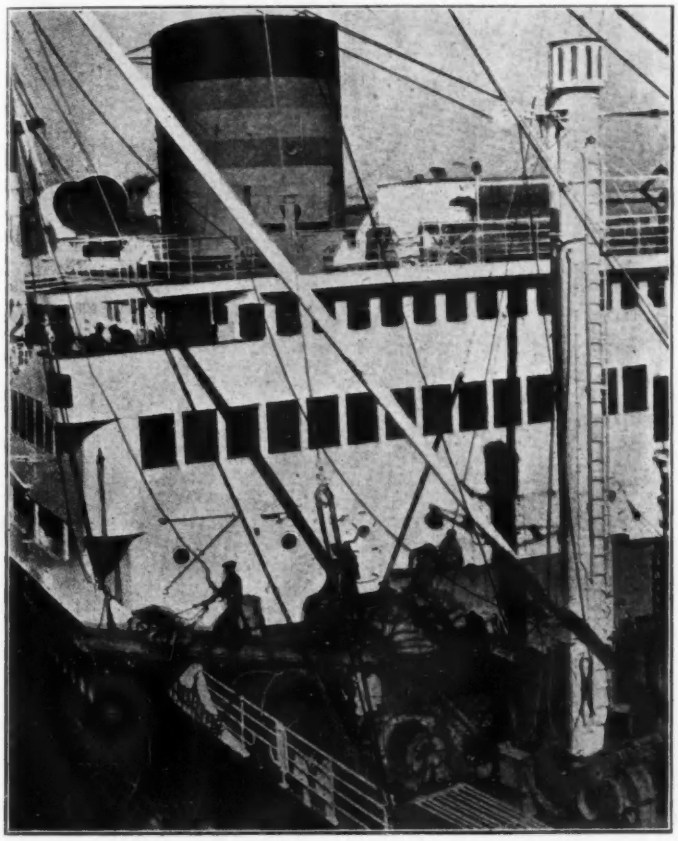
*Reproduced from "New Orleans Port Record," April, 1943.

Coffee and its Association with the Port of New Orleans, U.S.A.—continued

first grown in the northern part, in Belem, State of Para, in 1727. From the northern states of Brazil coffee finally found its way to Rio de Janeiro and from there gradually spread to the central and southern states, where it reached its highest productivity.

In Africa, the continent of origin, we find the coffee tree growing, both wild and under cultivation in Abyssinia, Eritrea, Somaliland, Kenya, Uganda, and many other places. In Asia the tree grows on the Arabian Peninsula, India, and Indo China. In Oceania coffee grows on a large number of islands.

In the Western Hemisphere we find the tree growing in Mexico, all of the Central American countries, the West Indies, and nearly all of South America, but notably in Brazil and Colombia.



Coffee Shipment.

Production of Coffee

Brazil is the world's largest grower and accounts for over 50% of the world's total production. The second largest producing country is Colombia, with about 15%. Central America produces about 12%.

The annual average of the world's exportation of coffee during the five-year period 1935 to 1939 totalled 27,451,794 bags (about 132 lbs. per bag) toward which Brazil contributed about 15,000,000 bags more than the whole production of the rest of the world.

The United States is the world's largest buyer of coffee, in normal years taking approximately half of all the coffee produced in the world. Under existing conditions it is almost the only buyer, but U.S. importations are greatly reduced on account of the shipping situation which, in turn, is responsible for the rationing of this commodity.

Santos, on account of the large exports of coffee from Brazil, is one of the great seaports of the world. In 1939, out of a total of 16,600,000 bags exported by the whole of Brazil, Santos shipped 11,169,836 bags. This shows the important position this great port occupies in the coffee economy of Brazil.

History of Coffee Shipments Through New Orleans

It has been said that the best barometer of the destiny of the Port of New Orleans is coffee. It is the most widely-distributed commodity imported by the United States and for this reason it has sought in the past and will seek in the future the channels of least resistance by which to enter this country.

According to Martin's "History of Louisiana," New Orleans imported 1,438 bags of coffee in the year 1803, when Louisiana was transferred by Napoleon to the United States. It is not a matter of record where this lot originated, but it could not have been Brazil, because the first record of coffee imported into the United States from Brazil was a shipment discharged at Salem, Massachusetts, in 1809. As coffee was cultivated in the West Indies before it was grown in Brazil, this first shipment to New Orleans may have originated in Haiti or Martinique.

No freight moved up the Mississippi River from New Orleans until 1814 owing to the difficulties of navigating the current. By the year 1820 New Orleans was entrenched as the gateway of the Mississippi. Coffee must have been a very important item of commerce between 1820 and 1857 because in this latter year 531,236 bags were imported through New Orleans. Of course, the blockade during the Civil War put a stop to imports until 1866 when the total amounted to only 55,000 bags.

Unloading Bags of Coffee.

By 1871 New Orleans had increased her imports to 250,000 bags but it was not until the late years of the nineteenth century and the early part of the present century that any considerable expansion of this trade took place. The construction of the modern port facilities of New Orleans began about this time and while these facilities were not solely responsible for the great increase in coffee imports, it may truthfully be said that this increase would hardly have been possible without them.

In 1901 the total imports to New Orleans amounted to 514,000 bags, almost reaching the total of the years just prior to the Civil War. By 1904, however, the coffee imports through New Orleans had doubled and by 1909 had redoubled, reaching a total of 2,000,000 bags. In the year just prior to our entrance in the present war, our imports through New Orleans had reached the enormous figure of over 3,000,000 bags from Brazil alone, and a total from all countries, including Brazil, of over 3,700,000 bags. Our imports of mild coffee through New Orleans (from all countries other than Brazil) total about 700,000 bags annually.

New Orleans is the second largest port in the world in the importation and distribution of coffee, New York being first. Other important coffee distributing centres in the United States are Baltimore, Jacksonville, Philadelphia, and Boston on the Atlantic Seaboard; San Francisco, Los Angeles, and Seattle on the Pacific Coast; and Houston, Texas, in the Gulf of Mexico. San Francisco is the third largest distributing centre in the United States.

Handling Coffee at the Port of New Orleans

It is no longer possible for the visitor to wander along the river front and watch the ocean liners discharging their cargoes from overseas, but no sight is more interesting than the discharging of a large coffee cargo.

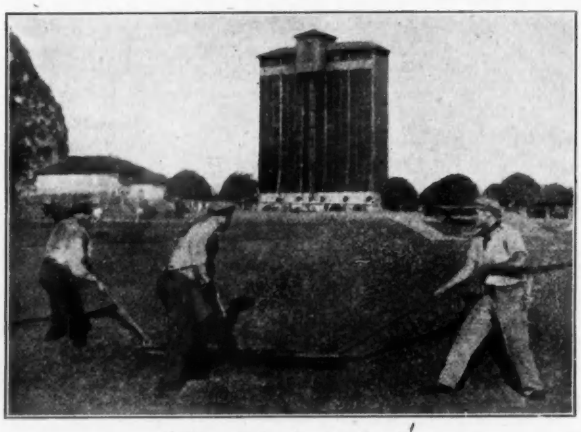
Coffee and its Association with the Port of New Orleans, U.S.A.—continued

In 16 to 18 days after leaving Brazil, the ship docks at the Poydras Street Wharf, a specially constructed coffee dock owned by an agency of the State of Louisiana, the Board of Commissioners of the Port of New Orleans, known as the " Dock Board." This dock was built 16 years ago after plans approved by the coffee importers and officials of the steamship lines, who have the preferential use of the dock. The dock is a double-deck steel and concrete structure. It is 1,370-ft. long and has 514,473 sq. ft of covered floor space.

To ensure quick movement of coffee to interior points, the transfer from ocean steamer to connecting carrier is made by motor trucks. Some of these trucks carry over 100 bags of coffee. Easy grade ramps enable them to go to the second floor of the warehouse to load coffee (for local importers, or to be forwarded to interior buyers) just as readily as they can go to the first floor.

Mechanical conveyors are not used for discharging coffee as they are for loading it at Santos. This may suggest to the casual observer that the Port Authorities at New Orleans are not as progressive as those at Santos. This is not true. The Port Authorities some years ago proposed installing the most modern machinery for the quick discharge of coffee that could be obtained. For a reason peculiar to the coffee trade, the coffee carrying lines opposed the installation of such equipment. The reason is that, under normal conditions, a ship from Brazil usually carries anywhere from 60,000 to 100,000 bags of coffee. There will be from 150 to 200 different marks. The method of receiving and loading the coffee in Brazil precludes the possibility of stowing each separately. Bags of the same mark might be stowed in two or more compartments. To meet the requirements of the trade, all of these bags must be assorted according to marks as the coffee comes out of the ship. The speed with which the coffee ship can be discharged is, therefore, controlled by the speed with which the marks can be assorted. No method of assorting has yet been devised that enables the assorters to keep ahead of the discharge when all hatches are being worked to capacity with the ship's winches.

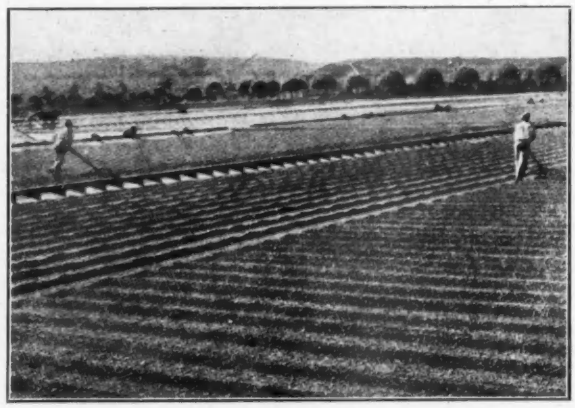
The assorting of coffee at New Orleans is, in the opinion of many people, one of the most interesting and colourful sights connected with the various handlings this commodity receives from the time it leaves the interior of Brazil to its delivery to ultimate consumers. To my mind, however, the colourful stories that are told by good fellows everywhere, as they meet day by day to enjoy this wonderful beverage, is one of the motivating forces that



Coffee production in Brazil.

through the centuries has caused the tremendous increase in the world's trade in this commodity. These meetings may have had their origin in Arabia, Persia, then Turkey, and eventually in the famous coffee houses of Old London, but in many cities all over the hemisphere, and in none more than our own beloved New Orleans, these meetings, when coffee was freely available, helped make life more enjoyable.

To get back to the coffee assorters of New Orleans; these men are trained for their job, or profession, as it might be called. They cultivate a memory for marks, symbols and locations which to the uninitiated seems almost superhuman. The coffee is discharged in specially designed slings holding 13 bags. It is lifted from the hatch by the ship's boom or derrick and landed on a four-wheel platform truck. After three of these trucks are loaded they are hauled from the ship side by tractor to a point in the warehouse which may be 200-ft. distant. These men, called " raisers," place the coffee bag by bag on the heads of men called " toters." These " toters " pass the assorter, who has a baton in his hand. With this he strikes the bag two or three times, barks out an order, and hands the " toter " a flag. The " toter " then carries the bag to



The well cultivated coffee finca.

the location indicated by the assorter, puts it down and sticks the flag bearing the symbol in the bag. As long as an hour after, another " toter " may pass the assorter with a bag bearing the same mark and after striking the bag so that the " toter " will know it is his order which is being called, the assorter promptly tells the " toter " what the symbol for that mark is and where to find it. This procedure is carried out throughout the ship's discharge until every bag of the same mark is place in the same place.

Each assorter owns a set of small flags about 12-in. by 14-in., fastened to a small metal rod. These flags bear symbols designed by the assorter. There may be a green flag with a yellow crescent or a blue flag with a different coloured half moon, a monkey, a bird, a bottle, or any other design which strikes the fancy of the assorter. Ordinarily each assorter owns 120 or more of these flags, each bearing a different symbol. A first class assorter can carry in his head at least 120 symbols, remembering the marks which each symbol stands for and where the stacks bearing these marks are located. During an eight-hour day, he can assign coffee to these stacks at the rate of about 1,000 bags an hour.

Position of New Orleans in the Distribution of Coffee

While more coffee is handled through the Port of New York than New Orleans, the imports through this port have been steadily increasing. At one time we handled less than 10% of the total coffee imported by the United States, but just prior to our entrance in World War No. 2 we were handling over 35%. The average annual consumption of coffee in the United States a century ago was less than one pound per capita. This has steadily increased until it reached 12 lbs. per capita in recent years. As coffee can be distributed through New Orleans to a wider territory than through any other port, it will only be a question of time, as the population of the Mississippi Valley increases, when it will become the world's largest coffee distributing centre.

Retirement of Clyde Port Official.

At a recent meeting of the Clyde Trustees, Mr. David Jones, granary and lairage superintendent at Glasgow Harbour, tendered his resignation, which was accepted with regret. Mr. Jones has been an official of the Trust for 30 years. He was the first superintendent of the granary, and since 1934 he had also been superintendent of the animal lairage.

Legal Notes

Cargo Handling: Alleged Breach of Dock Regulations

On page 22 of our May issue, we reported a case in which a claim was brought by a Liverpool dock labourer against a firm of stevedores for damages for personal injuries in consequence of an accident alleged to be due to a breach of Regulation 43 in the Dock Regulations of 1934.

Judgment was given by the Presiding Judge of the Liverpool Court of Passage in favour of the defendants with costs. Subsequently, an appeal was lodged for the plaintiff, Mr. Samuel Richard Ashworth, and this was heard in the Court of Appeal on September 29th, before the Master of the Rolls, Lord Justice Du Parcq, and Lord Justice Goddard.

For the appellant it was stated that on Nov. 30, 1941, Ashworth was a member of the quay gang engaged in unloading sacks of rice from a steamship at the Queen's Dock, Liverpool. The unloading was by sling, and after one sack had been slung over the ship's side to the quay and Ashworth was removing it, another was put over without warning and struck him on the back. The main point raised was as to the construction of Regulation 43 of the Dock Regulations, which provided for a rail man, or signaller, to indicate to the crane-driver that it was safe for him to sling sacks on to the quay. Counsel submitted that there was a breach of the regulation. The obligation, he said, was to employ a rail man continuously. In this case there was no such employee on the job at the time of the accident.

On behalf of the defendant it was denied that there was any breach of the regulation, and it was contended that the judge's findings on the evidence were correct. There was a complete gang at work at the time and if one member was temporarily away that did not amount to a breach of the regulation or of statutory duty. He submitted that it would be going to extremes to make the employers liable if a signaller forgot to, or did not, signal every individual sack that went over the side.

Giving judgment, the Master of the Rolls said that in his view the obligation on the employers imposed by the regulations could not be satisfied unless for each act of loading or unloading there was present on the job a qualified and properly instructed signaller, who had actually to be at work all the time loading or unloading was going on. The presiding judge's conclusion seemed to be that it did not matter so long as a railman had been engaged to do the job of signalling, and that, therefore, the employers were not liable. That conclusion, said his Lordship, seemed to be wrong. The appeal should be allowed.

Lord Justice Goddard and Lord Justice du Parcq agreed.

The appeal was allowed with costs, and damages amounting to £400 were awarded.

Responsibility of Stevedores for Dock Accident

A case was decided by Mr. Justice Hallett, in the Kings Bench Division on October 13th., in reference to the responsibility of a firm of Liverpool stevedores for an accident arising out of the alleged negligence of one of their crane drivers. The action and claim for damages were brought on behalf of the widow of Mr. W. T. Fenlon, a director of Messrs. W. H. Rhodes and Son, Ltd., of Liverpool. The defendants were Rea Ltd., stevedores and master porters, also of Liverpool.

The case for the plaintiff was that Mr. Fenlon, whose income was £1,000 a year, died as the result of the negligence of one of the defendants' servants. On March 17, 1942, at Gladstone Dock, Bootle, he was fatally injured when some carcases which were being unloaded fell out of a crane sling which came into contact with one of the ship's lifeboats as a result of not being lifted high enough. Mr. Fenlon's skull was fractured and he died a week later.

Defendants maintained that the crane driver, though in their general employment, was at the time of the accident, specially employed by Messrs. Rhodes and Son, who were appointed stevedores for the ship.

Mr. Justice Hallett, in giving judgment, said that the defendants were the stevedores to the berth holders at the dock and when the berth was appropriated to other shipowners the defendants might be called on to supply cranes and drivers for other stevedores. Rhodes & Son, Ltd., required the use of defendants' cranes and drivers on this occasion, and, after they had approached the berth holders, arrangements were made for the defendants' cranes to be put at the disposal of Rhodes and Son, Ltd.

The crane drivers were selected, engaged, paid for and dismissed by the defendants. If the conduct of the crane drivers gave rise to any complaint the complaint could not properly be addressed by Rhodes and Son, Ltd., to the crane driver direct. They had to go to the defendants' crane foreman, who visited the spot from time to time with a view to receiving any representations which might be made on behalf of the stevedores. It was plain that the stevedores had no power of control over the crane drivers so as to dismiss them. They could say what work was required and give them their signals for it, but the person exercising control was the defendants' crane foreman. There was always a presumption against the transfer of a man's services from his general employer to a temporary employer, but his Lordship was satisfied, apart from that presumption, that there was not a transfer of the services of the crane driver to Rhodes and Son, Ltd. He remained in the employment of the defendants though he performed his services in close co-operation with the services of the stevedores.

With regard to the question of negligence, the crane foreman had said that the crane driver would not have fouled the ship's lifeboat with the sling if he had used his discretion. The crane driver knew that if the sling swung to any serious extent it would come into contact with the lifeboat, and contact had in fact previously occurred. He went on with his task though he knew the load was swinging, and his Lordship was satisfied that any overloading of the sling was not the cause or a contributory cause of the accident. In his Lordship's view the crane driver was negligent in his manner of dealing with the load. If he had used his discretion properly he would never have fouled the boat.

Mr. Fenlon had been employed by Rhodes and Son, Ltd., for 30 years, and his Lordship assessed the damages for Mrs. Fenlon at £2,477 4s. 6d. He also awarded £675 damages to the plaintiff's 10-year old son and £125 to her daughter.

Judgment was entered accordingly, with costs.

Development of a Swedish Lake Port

A report has been issued by a committee appointed to examine proposals for providing deep-water berths at the small port of Mariestad on the south-eastern side of Lake Vänern, Sweden. The following particulars have been extracted from a recent issue of *Lloyd's List*.

Mariestad, a town of some 6,000 inhabitants, is situated at the mouth of the Tidan River, and is the seat of the provincial governor of Skaraborg; its industries include paper and pulp mills and the well-known Uniça pressed-fibre goods factory. Its harbour, mainly used by yachts and other small craft, has about three metres of water, and its narrow entrance limits its use to vessels of under about 500 tons d.w. The depth of water in the Trollhättan Canal, connecting Lake Vänern with Gothenburg and the sea, is four metres, and a port with that depth of water can accommodate vessels of 3,000 tons d.w. It is desired to have direct communication with foreign ports and avoid transhipment at Gothenburg, and it is maintained that the provision of deep-water quays would be of advantage to the whole province.

The committee has put forward three proposals, the cost of which is estimated at between 1,800,000k. and 2,400,000k. An entirely new site for the harbour is proposed, thus avoiding the need for using the present narrow entrance channel, about a kilometer in length.

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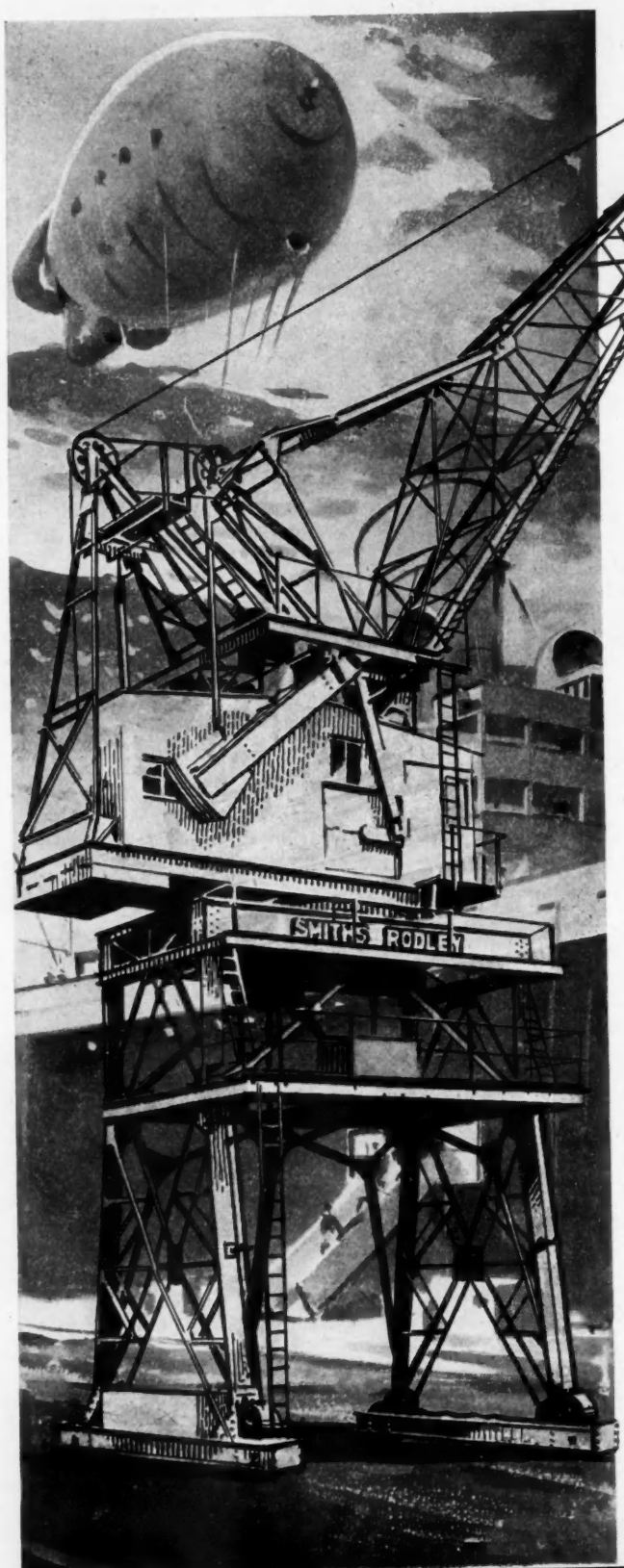

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